PSYCHOSOCIAL INTERVENTIONS FOR SUICIDE PREVENTION

EDITED BY: Raffaella Calati and Jorge Lopez-Castroman

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PSYCHOSOCIAL INTERVENTIONS FOR SUICIDE PREVENTION

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Table of Contents

Editorial: Psychosocial Interventions for Suicide Prevention

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Editorial on the Research Topic

Psychosocial Interventions for Suicide Prevention

Psychosocial approaches to the understanding and prevention of suicidal behavior have been wished-for since the pioneer work of Emile Durkheim (nineteenth century), who studied suicide to demonstrate how social factors played a key role in the genesis of human behavior. Many years passed before his ideas took hold, but in the last few decades initiatives to reduce the rates of suicidal behavior are arising throughout the world. This Research Topic was conceived to provide a picture of current psychosocial approaches to prevent suicidal behavior. Our aim was attained thanks to a variety of remarkable contributions (11 articles) ranging from suicide survivors to social media coverage or medical training.

To start off, Cramer and Kapusta point out the necessity of articulating a multi-level approach to suicide prevention. The Social-Ecological Suicide Prevention Model contemplates risk and protective factors at four different levels: individual, interpersonal, community, and societal. The authors posit that such a model would help to build up an integrative theory of suicidal behavior and rationalize the application of suicide prevention policies. Their conclusions are linked to the perspective paper by O'Connor and Portzky that collected expert opinions to identify the key challenges and developments in suicide research and prevention. Far from been complacent, numerous major challenges are discussed. One of them concerns prevention through web and social media and it is treated very practically by Notredame et al. in another paper. Building on recent evidence, this paper outlines a "digitally augmented prevention policy" and describes three main functions of preventive actions through the web and social media: gatekeeper, communication outreach, and intervention outreach. Of course, applying such a model will imply a multidisciplinary effort and changes in our usual practice.

Some papers have focused on populations surrounding suicidal persons and deserving attention. This is especially the case of suicide survivors, who have rarely been described in detail despite their exposure both to a suicide model and to unusual levels of complicated grief. Bellini et al. provide a rare and detailed account on the mental health state of several suicide survivors participating in psychological autopsies. Because they might become suicide survivors, caregivers also need attention as important collaborators providing support in many different formats and being able to detect the transition from suicidal ideation to behavioral enaction. As pointed by Le Moal et al., few studies have focused on caregivers to improve suicide prevention. Medical students constitute another important population given their role in the community as future providers of care and access to care. Recent reports from different countries confirm that medical studies are commonly associated with elevated levels of stress, depressive symptoms and suicidal ideation. Gramaglia and Zeppegno discuss how medical training can enhance self-recognition of mental distress, reduce barriers to treatment-seeking and increase favorable attitudes toward suicidal behavior through

personal experience. Finally, Brown et al. have studied the effect of a workshop for gatekeeper training in the attitudes, skill confidence and knowledge in a large sample of school staff. Although participation in this day and a half workshop induced a change in negative attitudes toward suicidal behaviors, the change did not last long. Participants, especially teachers, felt nonetheless more able to deal with suicidality even 6 months after the workshop.

Méndez-Bustos et al., undertook a systematic review of any observational paper investigating psychotherapeutic interventions to reduce suicide risk. These papers were not previously considered in prior meta-analytic studies and they provide interesting insights given the problematic adherence of suicidal patients to randomized controlled trials. The most relevant conclusions involve the need to increase the quality and exhaustiveness of reports in this domain and the interest of group and web therapies. The second systematic review and meta-analysis found that adolescents with self-harm were more engaged with treatment when they received any psychological therapy compared to treatment as usual (Yuan et al.) Treatment engagement was defined as attending four or more sessions and treatment as usual involved typical follow-up appointments with no structured therapy. This finding updates a previous meta-analysis that found no difference in engagement between the same groups, and supports the interest of structured psychological treatments in this population since non-adherence is rather the rule that the exception.

Interesting aspects of psychosocial interventions for suicide prevention are treated in mini-reviews. Prada et al. didactically describe the components of dialectical behavioral therapy (DBT) and how each of them has a precise effect in the reduction of self-harm and suicide attempts among patients with borderline personality disorder. The study of each module of a multi-component therapy, such as DBT, is the key to optimize future interventions. Since a one-fits-all treatment does not seem to be sufficiently effective in suicide prevention, we might need to design personalized treatments selecting the most convenient components. The second mini-review (Zeppegno et al.) contemplates psychosocial interventions for older adults. Not only the population of older adults is increasing very fast in developed countries, they are also more exposed that any other age group to the risk of suicide and more vulnerable to pharmacological treatments. However, only few studies had specifically addressed the issue of psychosocial interventions to this age group.

Following the lines traced by the contributions to the Research Topic, we can conclude that psychosocial interventions are effective but the challenges ahead are still important. Firstly, a personalization of treatment approaches depending on age, gender, or psychopathology is needed. Focusing future studies in the components of psychosocial interventions would help to determine which treatment program works better depending on the set of symptoms or the characteristics of a person. Finally, the advancement of the field requires innovation, notably through new computational methods (e.g., machine learning to predict treatment response), and new technologies (e.g., web-based or mobile phone–based tools), to encompass different levels of risk factors extending from the society to the individual in danger. In that quest, the role of the social environment that surround a suicidal person is not to be forgotten.

AUTHOR CONTRIBUTIONS

JL-C wrote the manuscript. JL-C and RC edited and revised the manuscript.

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A Social-Ecological Framework of Theory, Assessment, and Prevention of Suicide

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The juxtaposition of increasing suicide rates with continued calls for suicide prevention efforts begs for new approaches. Grounded in the Centers for Disease Control and Prevention (CDC) framework for tackling health issues, this personal views work integrates relevant suicide risk/protective factor, assessment, and intervention/prevention literatures. Based on these components of suicide risk, we articulate a Social-Ecological Suicide Prevention Model (SESPM) which provides an integration of general and population-specific risk and protective factors. We also use this multi-level perspective to provide a structured approach to understanding current theories and intervention/prevention efforts concerning suicide. Following similar multi-level prevention efforts in interpersonal violence and Human Immunodeficiency Virus (HIV) domains, we offer recommendations for social-ecologically informed suicide prevention theory, training, research, assessment, and intervention programming. Although the SESPM calls for further empirical testing, it provides a suitable backdrop for tailoring of current prevention and intervention programs to population-specific needs. Moreover, the multi-level model shows promise to move suicide risk assessment forward (e.g., development of multi-level suicide risk algorithms or structured professional judgments instruments) to overcome current limitations in the field. Finally, we articulate a set of characteristics of social-ecologically based suicide prevention programs. These include the need to address risk and protective factors with the strongest degree of empirical support at each multi-level layer, incorporate a comprehensive program evaluation strategy, and use a variety of prevention techniques across levels of prevention.

Keywords: suicide, prevention, social-ecological model, risk assessment

Suicide rates in the United States are increasing in the last decade from 11.0 (per 100,000) in 2004 to 13.4 in 2014 (Drapeau and McIntosh, 2014). Most recent data summarized by the Centers for Disease Control and Prevention (CDC) echoes this pattern with detailed analyses showing that trend inclines may be moderated by factors such as gender, age, and method (Centers for Disease Control and Prevention, 2016a). What is particularly concerning is that the increasing suicide rate is occurring in the presence of a 2012 national suicide prevention strategy put forth by the U.S. Surgeon General's Office, which is based on four broad strategic directions reflecting a multi-level perspective: (1) create supportive environments promoting healthy, empowered persons, families, and communities; (2) enhance community-oriented prevention services; (3) promote timely, supportive services, and; (4) improve suicide-related surveillance data (United States Surgeon General's Office, 2012).

Despite progress in the effectiveness of suicide prevention efforts (Mann et al., 2005; Zalsman et al., 2016), suicide prevention still suffers from several critical limitations: the inability to predict suicidal behavior in individuals (Fowler, 2012; Chu et al., 2015; Chan et al., 2016), inconsistent suicide-related terminology (Skegg, 2005; Silverman and De Leo, 2016), lack of multi-level theoretical development (O'Connor, 2011; Barzilay and Apter, 2014), and insufficient implementation of multi-level prevention programs (Hegerl et al., 2008; van der Feltz-Cornelis et al., 2011). Informed by theoretical, risk/protective factor, and prevention program evidence, we articulate a conceptual multi-level framework for suicide prevention.[1] We further make recommendations concerning development of multi-level suicide risk theory, research, assessment and prevention.

THE STATE OF SUICIDE PREVENTION EFFORTS

The current scope of suicide prevention efforts spans primary prevention (e.g., public awareness campaigns), secondary prevention (e.g., gate-keeper training programs), tertiary prevention (e.g., psychotherapy), and postvention (e.g., survivor support groups). Extending these traditional categories on a mental health intervention spectrum, suicide prevention can be applied at a universal (i.e., to the general public), selective (e.g., groups defined by lifetime risk such as military personnel), and indicated prevention (i.e., high risk groups where risk is already elevated—e.g., psychiatric inpatients) levels (Institute of Medicine Committee on Prevention of Mental Disorders., 1994). A recent systematic review summarizes the overall state of effective suicide prevention programs across these levels (Zalsman et al., 2016). The findings support reduction of suicide-related thoughts and behaviors (i.e., ideation, attempts and completed suicide) for: (1) restricting access to lethal means (e.g., hot-spots for jumping), (2) school-based awareness programs, (3) lithium and clozapine use, and (4) psychotherapeutic efforts for depression. Authors also noted a lack of current evidence for an array of other prevention approaches (e.g., gatekeeper training, physician and public education).

Of the few approaches that cut across more than one of multiple potential levels of prevention, recent efforts by the United States (US) National Action Alliance for Suicide Prevention have focused on initiatives (e.g., Zero Suicide, Vision Zero) toward the goal of absolute elimination of suicide (Erlich, 2016). Components of these approaches range from improving follow-up practices with patients post-discharge and maintaining contact with at-risk persons to enhancing infrastructure (e.g., personnel, training content) and prevention resources. Two promising tertiary suicide prevention strategies common to clinical psychiatry are Dialectical Behavior Therapy (DBT) (Comtois and Linehan, 2006) and the Collaborative Assessment and Management of Suicide (CAMS) (Ellis et al., 2015). A noteworthy gap is that, even clinical or targeted approaches

showing potential effectiveness are unable to simultaneously target the individual through societal level influences on suicide risk.

A MULTI-LEVEL UNDERSTANDING OF SUICIDE PREVENTION

We echo other calls in the literature for a multi-level public health approach to suicide prevention (Dahlberg and Krug, 2002; van der Feltz-Cornelis et al., 2011). The CDC provides valuable guidance based on the assumption that prevention efforts for any health or disease issue require integrated multi-level efforts within a Social-Ecological Model (SEM) (Centers for Disease Control Prevention, 2017). The SEM is a four tier framework for organizing risk and protective factors, which then inform corresponding prevention strategies. From macro to micro levels, the four strata are: societal, community, relational, and individual levels. Societal factors concern larger scale issues such as social and cultural norms, policies, and other guiding rules or laws. Community level influences are those circumscribed to a certain region like neighborhood centers, schools, workplaces and healthcare providers. Relational factors are those defined by direct person-to-person interaction such as social support or withdrawal, peers, and family. Individual level factors pertain to person characteristics such as demographics, attitudes, health conditions, and others. The SEM has been meaningfully applied to a range of health issues and prevention programs such as health literacy (McCormack et al., 2017) and vaccine usage (Kumar et al., 2009).

We see at least three straightforward benefits of such a multi-level schema. First, suicide risk and protective factor literature tends to be fragmented by SEM level. That is, even where summaries of risk factors are provided, they are often limited to one or two SEM levels. An SEM of suicide prevention, therefore, provides a potentially comprehensive framework for organizing risk and protective factor knowledge; as such, it is a working template for adding new factors, as well as integrating levels to examine how upper level factors may moderate the influence of lower level factors, and vice versa.

Following from enhanced organization of factors, a second benefit is that an SEM of suicide prevention can provide grounding for multi-level intervention and prevention program design and implementation. This idea has been demonstrated by closely-related comprehensive approaches to prevention of gun violence prevention (Rubens and Shehadeh, 2014) and campus sexual assaults (Centers for Disease Control Prevention, 2016b). For instance, Rubens and Shehadeh organized potential interventions and preventions for gun violence in the US along levels of the SEM, noting potential strategies ranging from individual (e.g., parent-child relationships) to societal (e.g., financial liability for those violating gun safety norms) approaches (Rubens and Shehadeh, 2014). Finally, articulation of a multi-level approach to suicide prevention can provide a framework for the re-organization of current theories of suicide. That is, to date causal theories of suicide consistently fail to fully integrate multi-level perspectives. It is our hope that a

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[1]Authors recognize not every construct can be defined due to the brevity of personal views format articles.

social-ecological view of suicide prevention would spur growth and effectiveness in theory and practice.

TOWARD A SOCIAL-ECOLOGICAL MODEL OF SUICIDE PREVENTION

In support of a multi-level approach to suicide prevention, Caine proposed to frame suicide prevention within an SEM model in terms of its shared risk with interpersonal violence (Caine, 2013). However, the resulting ecological model of shared risk was limited in scope in terms of merely listing sample risk and protective factors in common for both suicide and interpersonal violence. Extending this approach we articulate a comprehensive picture of risk and protective factors associated with at least one aspect of suicide-related thoughts and behavior, yielding the SESPM.

Search Strategy and Selection Criteria

[2] In order to balance comprehensiveness of sources cited, while also recognizing brevity of this manuscript format, we did the following to identify sources to inform the SESPM. We searched Pubmed, Medline, Psychinfo, and Psycharticles using combinations of the following phrases: "suicide," "risk factor," "protective factor," "prevention," "intervention," "review," and "meta-analysis" while focusing on articles from 1980 to present. Reviews and meta-analyses were given priority because we aimed to provide a big picture review (see **Table 1**). We further used Google Scholar to identify pertinent content from the following major professional organizations: American Foundation for Suicide Prevention, Suicide Prevention Resources Center, American Association of Suicidology, World Health Organization, CDC, and Substance Abuse and Mental Health Services Administration. Once a full set of key sources was identified, we dropped sources that were completely redundant with others.

Selection of the final integrated body of existing evidence represented scoping/conceptual summaries (Bryan and Rudd, 2006; Van Orden et al., 2010; Drapeau and McIntosh, 2014; Bernard et al., 2015), systematic reviews/meta-analyses (Serafini et al., 2012; Calear et al., 2016; Chan et al., 2016; Ma et al., 2016; Zalsman et al., 2016; Franklin et al., 2017), mortality risk studies (Björksenstam et al., 2015, 2016; Madsen et al., 2017), measure development (Linehan et al., 1983), and policy analysis (Anestis and Anestis, 2015) into a unified SESPM framework, as presented in **Table 1**. In doing so, we differentiate factors widely applicable across groups vs. those that tend to demonstrate population-specific associations with suicide (e.g., military veterans, youth, lesbian, gay, bisexual and transgender [LGBT] persons). For example, concerning LGBT youth, literature consistently links population-specific experiences of internalized stigma and victimization as associated with suicide risk; moreover, sexual orientation minority status itself is linked with elevated suicide risk (Haas et al., 2011; Duncan and Hatzenbuehler, 2014). The need for attention to nuance

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[2]Our paper is not intended to be a systematic review; therefore, full search criteria and other details are not reported.

of even strong risk factors varying by population is further illustrated by primary psychiatric diagnoses linked to suicide. For instance, standardized mortality risk (SMR) and other research documents the exacerbated prominence of depression, bipolar, and cluster B personality disorders (e.g., borderline, antisocial) in enhancing risk for death by suicide among psychiatric patients (Björksenstam et al., 2015, 2016; Madsen et al., 2017). To illustrate, cluster B disorders are associated with SMRs in this population as high as 33–34 (Björksenstam et al., 2015; Madsen et al., 2017). Cannabis use and dependence, another diagnostically relevant disorder category, has been shown to be associated with exacerbated suicide risk, especially among adolescents and particularly when the cannabis is associated with experiencing of other psychiatric conditions (e.g., psychosis) (Serafini et al., 2012). Thus, cannabis use or dependence may also serve as poor coping or a pathway to suicide among adolescent youth.

We also note many factors with the strongest, most consistent associations with suicide risk (see **Table 1**), defining strongest and consistent in terms of effect sizes and odds ratios related to suicide-related thoughts or behaviors, direct associations with suicide (e.g., serving as a mediator), as well as those that are highlighted by clinical and prevention experts as those requiring attention across populations (e.g., depression). In all, SEM levels with the strongest support tend to be individual and interpersonal/relational levels. For instance, at the individual or interpersonal levels we note risk factors with the strongest associations with suicide-related thoughts and behavior such as a prior suicide attempt, diagnosis of depression or bipolar disorders, and suicide contagion. To illustrate, hopelessness provides a clear example of an individual psychological risk factor with considerable support; hopelessness has been identified as an independent risk factor for suicide requiring clinical assessment (Bryan and Rudd, 2006), and empirical data raises the potential that hopelessness may serve as a pathway to suicide-related thoughts and behavior explaining the influence of other risk factors (e.g., thinking styles) (Abramson et al., 1998). Moreover, protective factors such as presence, use and perception of positive social support is denoted as among the strongest factors (see **Table 1** for full list of demarcated factors with strongest research support). As such, from a public health education standpoint, the integrated summary may serve to reinforce the key factors to include in dissemination efforts by public organizations.

Given the fact that suicidology is an ongoing research field, the proposed SESPM is not intended to be exhaustive. The purpose of the SESPM is a guide to move research and prevention forward, as well as to provide a framework for understanding nuance in suicide prevention. To illustrate the latter point, examination of the multi-level organization identifies several levels at which for example firearm-related factors may influence suicide risk. While firearm access or ownership is associated with elevated suicide risk (Anglemyer et al., 2014), this link may be moderated by other individual (e.g., safe storage) (McCarten et al., 2001), relational (e.g., restricted means counseling) (Stanley et al., 2016), and societal (e.g., firearm restriction laws) (Anestis and Anestis, 2015) factors. The SESPM provides a summary of literature in order to build toward better mediation,

TABLE 1 | Compilation of major suicide risk and protective factors organized by levels of centers for disease control and prevention's social-ecological model.

Risk factors	Protective factors
Societal:	Societal:
Economic downturn/depression	Healthy economy
Living location with less restrictive firearm laws	Living location with more restrictive firearm laws
Seasonal variation	Mental health funding
Stigma about mental health and treatment	Northeast US
Air pollutants	
Viruses/parasites	
Poverty	
Mountain region of the US	
Western and southern US	
Community:	Community:
Exposure to community violence	Crisis support lines/hotlines
Local suicide epidemic	Healthcare/mental healthcare access
Barriers to healthcare access	Effective mental healthcare
	Trained gate keepers
	Community involvement
	School-based support and intervention programming*
Interpersonal/Relationship:	Interpersonal/Relationship:
Living in household with firearm	***Presence of social support***
Exposure to suicide/contagion	***Use of social support***
Family violence	***Perceived social support***
Family conflict	Concerns suicide is harmful to child/family
Family history of mental illness	Sense of responsibility to family
Family history of suicide/attempt	Healthy long-term committed relationship/marriage
Relationship instability	Help-seeking behavior
Death of a loved one	Children present in the home
Severing of romantic relationship	Pregnancy*
Social isolation/withdrawal	Pulling together
Combat exposure*	Caring letters
	Social connectedness
	Contact with caregivers*
	Support for connection with healthcare providers
	Cognitive-behavioral therapy
	Dialectical-behavior therapy
	Collaborative assessment and management of suicide (CAMS)
Individual:	Individual:
Biological	Biological
Male sex (completions)/Female sex (attempts)*	SSRI usage
Serotonin dysfunction	***Lithium/mood stabilizer treatment***
Family history of suicidal behavior	***Clozapine usage***
Socio-Demographic	Socio-Demographic
Gender (e.g., Transgender status)	Heterosexual sexual orientation
Lesbian, gay, bisexual or other sexual orientation minority identity*	Religiosity/spirituality (i.e., beliefs about suicide being wrong)*
Religiosity/spirituality (i.e., suicide as a resolution to problems)*	
Native American ethnicity*	
Hispanic ethnicity* Asian/Pacific Islander ethnicity*	
Whites (compared to non-Whites)*	
Older adult age*	
Middle adult age*	
High risk professions (e.g., military, law enforcement)*	
Firearm ownership (and unlocked, loaded)*	
Incarceration*	
High perceived/subjective stress	
Job loss/unemployment	
Financial strain	
Recent discharge from psychiatric hospital*	
Bullying/bias crime victimization*	

(Continued)

TABLE 1 | Continued

Risk factors	Protective factors
Psychiatric	Psychiatric
Mental health diagnoses/symptoms such as depression, bipolar, post-traumatic stress disorder, anxiety, and active phase schizophrenia	Treatment motivation
Personality disorders such as Borderline Personality	
Substance use/abuse (e.g., cannabis)	
Alcohol use/abuse	
Psychological	Psychological
Prior suicide attempt	*Coping skills*
Current suicidal thinking	Problem solving skills
Presence of suicidal intent	Moral objections to suicide
Presence of suicide plan	Survival beliefs/desire to live
Access to/presence of lethal means	Fear of suicide/death
Preparatory behaviors (e.g., giving away prized possessions)	Fear of social disapproval
Prior or current non-suicidal self-injury	Optimism
History of other suicide (e.g., ideation)	*Hopefulness/positive future orientation*
Hopelessness	Life satisfaction
Low self-control/high impulsivity	Intact reality testing
Aggression	High self-esteem/self-efficacy
Agitation	Resiliency
Emotion dysregulation	Extraversion
Severe mood change	*Additional reasons for living*
Childhood abuse	
Feelings of burdensomeness	
Rejection/thwarted belonging	
Chronic illness*	
Acute health symptoms*	
Fatigue	
Sleep disturbance/disorders	
Neuroticism	
Introversion	
Limited openness to experience	
Perfectionism	
Homelessness*	
Low self-esteem	
Shame	
Physical pain tolerance	
Fearlessness of suicide/death	
Thinking errors/negative thinking	
Psychache/psychic pain	
Internalized stigma*	

*Risk or protective factor demonstrating unique importance for a specific population.
Bold italics font*,strongest risk/protective factor for suicide risk.*

moderation, and causal research, as well as multi-level prevention efforts.

RECOMMENDATIONS FOR SESPM-INFORMED RESEARCH, THEORY AND PROGRAMMING

Consequently, we advocate five next steps for the suicidology field.

Empirical Testing and Adaptation

We adopt the view that the SESPM is both preliminary and fluid, suggesting prevention may need to account for population- or context-specific considerations. For instance, the SESPM itself may vary by population or culture. To illustrate, it is well known that risk factors such as Human Immunodeficiency Virus (HIV) status itself (Carrico et al., 2007) and internalized HIV-related stigma (Cramer et al., 2015) play particularly salient roles in suicide risk, whereas other factors may be less important for this group. Additionally, the SESPM offers a clear organizational approach to future systematic reviews and hierarchical approaches to meta-analysis or regression. In all, with future empirical testing, the SESPM may need refinement or adaptation by population over time. We advocate in a first step to conduct risk and protective factor meta-analyses to develop appropriate SESPM templates for risk groups. In a second step, this quantitative information about the weight of risk factors should be used in population trials consequently (see **Figure 1**).

FIGURE 1 | Conceptual SESPM Model for theory, assessment and prevention program development. X, pathways in current suicide research that should be avoided in SEPSM-based model development.
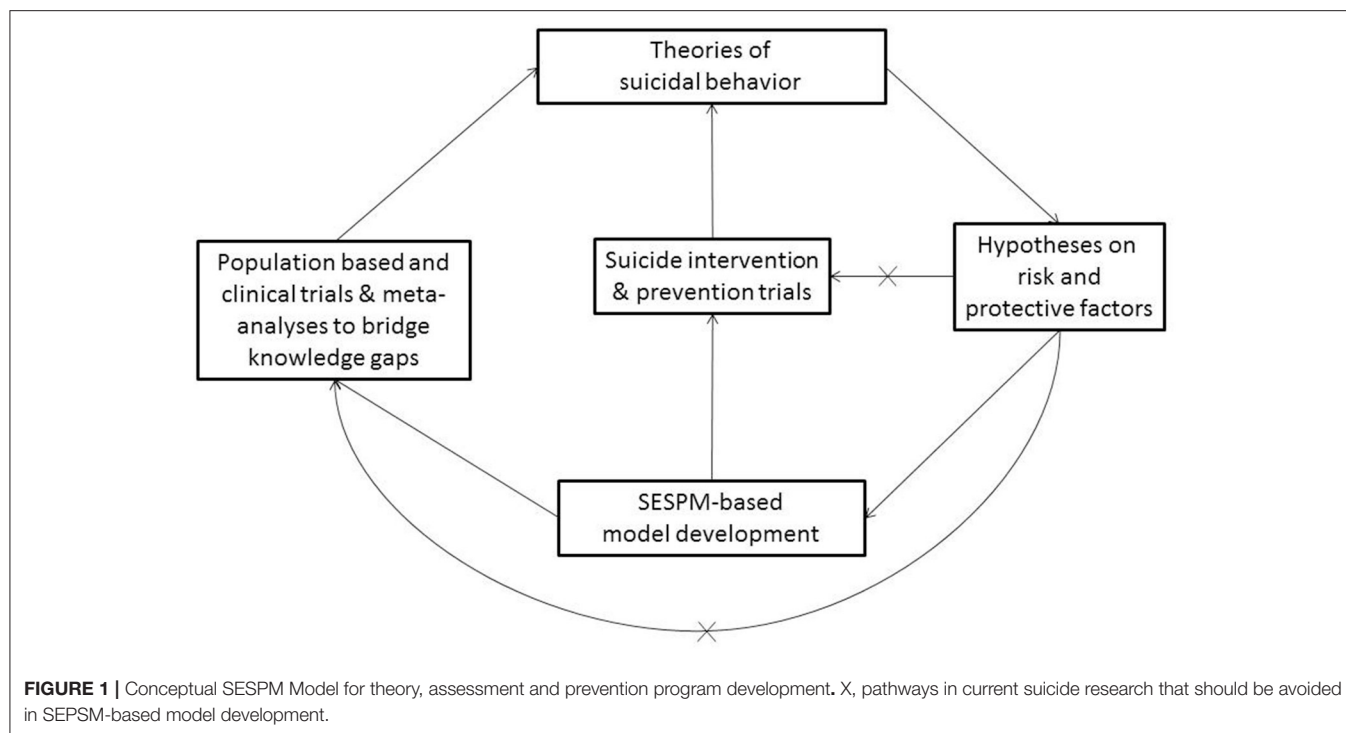
TABLE 2 | Sample suicide prevention and intervention strategies by level of the social-ecological model.

Social-ecological model level	Sample intervention and prevention programming	Sample theory of suicide
Societal	1. Firearm laws or regulations concerning storage, mental health background checks, etc.	Sociological theory of suicide
	2. Public awareness campaign targeting mental health and therapy stigma reduction.	
	3. Suicide-specific federal funding initiatives.	
Community	1. Crisis support lines.	Military transition theory
	2. Free mental health screenings provided by community mental health centers or in clinics treating high risk populations.	
	3. School-based programs targeting diversity-related social norms, mental health care access, or suicide awareness.	
Relational	1. Group psychotherapy.	Interpersonal-psychological theory of suicide
	2. Individual psychotherapy.	
	3. Gate keeper training.	
Individual	1. Adoption of positive health behaviors (e.g., exercise, food choices, sleep hygiene)	Cubic model of suicide
	2. Mental health literacy courses.	
	3. Positive coping skills training/adoption.	

A Framework for Public Health Education and Training Efforts

Promising suicide prevention education and training programming exists for the public (Teo et al., 2016) and medical/health professionals (Cramer et al., 2017), yet these areas are in need of further study (Zalsman et al., 2016). Moreover, empirically-tested educational prevention strategies often lack consistent structural framing. That is, content and modalities of these trainings vary, often neglecting content such

as community and societal level risk factors and prevention efforts. As has been done in the development of other public health prevention approaches such as HIV prevention (Baral et al., 2013), we encourage development of research/data summaries, educational materials, and training content to be organized by SESPM levels. For example, graduate training or continuing education programs may address established suicide prevention-related competencies (Rudd et al., 2008; Cramer et al., 2013) by SESPM level. While a full program-wide

review of such competencies is beyond the scope of this piece, using structured training approaches like observed structured clinical examinations (OSCEs), health professions literature (Hung et al., 2012; Cramer et al., 2016) highlights necessary skills for health providers like knowing empirically-indicated risk/protective factors and intervention/support possibilities. Established training models such as patient simulation or online-mediated courses can integrate such skill development and factual content into a SESPM framework. The end goal of such an approach would be that SESPM-educated health clinicians may be able to make better use of their multi-level knowledge and skills in working with at-risk individuals or designing stronger prevention programs.

Multi-Level Suicide Risk Theory

Historically, public health and health science prevention efforts have lacked adequate theoretical grounding. Recent health professions literature argues that effective prevention efforts requires strong grounding to bolster effective health behavior change (Im, 2015; Prestwich et al., 2015; Krieger, 2016). The advantages of theory-informed public health include conceptualization of multi-level prevention/intervention programming, transdisciplinary communication, and accounting for practical societal and scientific influences (e.g., funding, political issues). Interestingly, social and behavioral science literature focuses on suicide as the subject of theoretical speculation, although there are varying levels of empirical testing and support across these theories.

Although a full review of all contemporary suicide risk theories is beyond the scope of this work, we provide an example theory with short description for each SESPM level for illustrative purposes (see **Table 2**). From top down, example theories can be seen in societal (e.g., *Le Suicide*) (Durkheim, 1897), community (e.g., Military Transition Theory) (Castro and Kintzle, 2014), relational (e.g., Interpersonal-Psychological Theory of Suicide) (Joiner, 2005; Van Orden et al., 2010), and individual (e.g., Cubic Model of Suicide) (Shneidman, 1981) level perspectives. In his seminal text *Le Suicide*, sociologist Emil Durkheim theorized suicide as a reaction to the intersection of social integration (the clustering of people in social groups) and regulation (the extent of rituals and customs being influenced by societal norms) (Lester, 1999). Rooted in a litany of causes for suicide among US veterans, Military Transition Theory highlights suicide risk as a function of factors unique to the community of military personnel reintegrating into civilian life (Castro and Kintzle, 2014). A three-stage transition is posited: approaching, managing, and assessing the transition. These stages imply a degree of multi-level influence in that they require the person to navigate and evaluate individual, familial, work and other challenges.

The Interpersonal-Psychological Theory of Suicide (IPTS) posits that suicide thinking is a function of self-perceptions in relation to others; negative interpersonal cognitions occur in two forms: thwarted belonging and perceived burdensomeness (Van Orden et al., 2010). Ideation transitions to an attempt when the individual has developed sufficient habitation to pain and fearlessness of death in order to commit the act. In this way, the IPTS may be considered both individual and relational in nature. Finally, Shneidman articulated an individual theory of impulsive suicide (Shneidman, 1981). The impulsive act, calculated to be fatal by the attempter, is thought to occur in the presence of acute psychological states of stress, agitation and psyche (i.e., emotional pain).

Relying on the SESPM organizational framework of risk and protective factors (see **Table 1**), we believe a valuable next step in the theoretical development and testing is a *multi-level or social-ecological theory of suicide* in both population-based and clinical trials, as well as in interventions (see **Figure 1**) in order to inform theory development and prevention programming. The "x" lines refer to the idea that suicide research suffers from the problem of repeated over simplification of studies bypassing a comprehensive use or development of a multi-level model. Therefore, as illustrated in **Figure 1**, it is critical to understand that the proposed SESPM, a multi-level organizational framework, does not constitute a true theory of suicide by itself. However, following the pathways outlined in the Figure, a consistent and causal theory of suicidal behavior should be deductible from such a framework, and therefore be empirically testable (Horvath, 2016). A social-ecological theory of suicide, for instance, may specify individual attitudes, traits and mental health symptoms as primary, direct predictors of imminent suicide risk. Complementing that testable hypotheses, societal or community level factors, as well as sub-population variation, may serve as directly influence chronic risk, while also playing moderating roles concerning how individual and relational factors affect imminent or acute risk.

Enhancing Suicide Risk Assessment Methods

Despite a proliferation of suicide risk assessment tools (Lotito and Cook, 2015), recent evidence suggests limited ability to predict future suicidal behavior (Chan et al., 2016; Large et al., 2016). Self-report instruments suffer an identical limitation much of suicide-related theory and risk/protective factor summaries have: a lack of accounting multi-level understanding. For example, the most commonly used self-report tools often assess the frequency and nature of past/present/future ideation and attempts, strongly correlated mental health symptoms (e.g., depression, hopelessness), or protective factors (e.g., reasons for living). While such information is clinically useful to fill in gaps not otherwise captured in interview (Lotito and Cook, 2015), it is still limited in scope.

Several assessment structures exist in the literature, sometimes hinting at the need to address multi-level facets. Such attempts have led to different recommendations for the development of suicide risk assessment tools, but none of these strategies have seen effective implementation yet. For example, suicide risk assessment is often based on lists of symptoms without an integrated perspective (Kral and Sakinofsky, 1994), therefore proposing a model that comprises both background and subjective suicide risk factors. The former are the socio-demographic indices associated with increased risk which are based on different populations and cultures, and are prone to change over time. The latter, background risk factors, can inform the clinician about a patient's general level of risk, while the assessment of individual factors focusses on emotions, cognition, idiosyncratic meanings, general mental state, and experience.

Suicide risk assessment methods can also be based on factors falling into (1) individual, (2) clinical, (3) interpersonal, (4) situational, and (5) demographic categories, thus encompassing some of the SESPM levels suggested herein (Simon, 2011).

In total, the variation in recommended methods suggests that a one-size-fits-all solution to suicide risk estimation is an ill fit. Such methodological complexities might be responsible for the result of the most recent meta-analysis of suicide risk assessment scales, which concluded that there is insufficient evidence to support the use of risk scales and tools in clinical practice due to the rather low positive predictive value (PPV) of the scales, which ranged between only 1.3 and 16.7% (Chan et al., 2016), with 87% false positives, a clinically imprecise, economically intensive and unnecessarily stigmatizing proportion. We argue that the heterogeneity and confusion about suicide risk assessment methods has its primary origin in the lack of a unified and empirically testable theory of suicidal behavior.

We posit that the next meaningful steps in suicide risk assessment tool development may lie in two areas: (1) a psychometrically-validated structured professional judgment (SPJ) of key multi-level risk factors, such as the Screening Tool for Assessing Risk of Suicide (STARS) protocol (Hawgood and De Leo, 2016) (which does not fully account for multi-level influences) and (2) a multi-level suicide risk assessment algorithm. For example, although a potentially time, resource and funding intense project, we recommend development of a suicide risk assessment tool for use by mental and medical health professionals that addresses risk and protective factors across all four layers of the SESPM. Such a new approach may be translated into a SPJ tool, an approach to mental health assessment that provides semi-structured rating forms to be used by trained health professionals. In addition, post-interview, more rigorous interviewer-rated checklists, could help to refine and validate the SPJ tool. Nowadays, online implementation and translation in different languages allows for the development of a globally available instrument for suicide risk assessment within an SESPM model for ongoing refinement. Violence risk literature provides examples of well-validated SPJs accounting for three SEM levels, accounting for empirically-indicated risk and protective factors for interpersonal violence, including individual (e.g., affective stability, substance use), relational (e.g., treatment compliance, personal/social support), and community (e.g., living situation, professional services) level issues (Douglas et al., 2013). Community level risk is further accounted for by the relevance of these factors to the setting of evaluation (e.g., inpatient hospital vs. outpatient clinic). Using the SESPM, it is plausible that a suicide SPJ could be developed by first identifying and testing a lengthy set of risk of factors, exposing the preliminary instrument testing in emergency room, outpatient clinic and inpatient hospital settings. After initial reduction and psychometric evaluation of the instrument, further testing would be required for longitudinal and cross-cultural validation. Likely, a culturally-adapted version of such an instrument would be quite useful.

Alternatively, it may be beneficial to develop a risk assessment algorithm, which is stratified by available knowledge (i.e., different sets of risk factors might be relevant for males vs. females, adolescents vs. elderly, etc.). As such, a computer-based suicide risk estimation algorithm may be developed in which a clinician can collect comprehensive multi-level patient and situational information, entering the information into a weighted equation. The first step in such effort is mathematical identification of a weighted formula, likely based on a validated multi-level theory of suicide that has to be developed. First approaches in the direction of a suicide risk algorithm have been provided; however, the presented tool was limited to six individual level factors (e.g., age, self-harm history) suitable for depressed persons for the prediction of suicidal ideation only (Liu et al., 2016). With simultaneous systematic review of multi-level risk and protective factors for suicide ideation, attempts, and completed suicide, identification of relative weights for an SESPM-based algorithm based suicide risk assessment tool should be attainable.

Development of Multi-Level Prevention Programming

First and foremost, SESPM-based research is needed to inform best practices for prevention programming. Thus, our recommendations for development of multi-level programming are provided with the caveat that further research and theory development are required. As a starting point, multi-level suicide prevention should address (1) general practitioner education concerning depression and suicide; (2) increased access to care for high-risk groups, and; (3) emphasis on restricting access to lethal means (van der Feltz-Cornelis et al., 2011). While we agree with the importance of these practical recommendations, we further posit that design of an ideal multi-level approach to suicide prevention would possess the following characteristics: (1) incorporation of the risk and protective factors with strongest empirical support relative to the population (e.g., general population vs. high risk psychiatric inpatients); (2) use of prevention strategies at each SESPM level; (3) inclusion of a multi-level program evaluation strategy including data gathered from patients and other stakeholders (e.g., therapists, policy makers, etc.)—patient data would include suicide and self-harm, whereas additional patient and stakeholder information could cover subjective and objective patient-oriented outcomes more generally; (4) grounding in relevant theory to inform mechanisms of change; and (5) presence of prevention efforts using at least primary and secondary prevention techniques where possible.

LIMITATIONS AND CONCLUSIONS

The SESPM perspective holds a number of limitations warranting attention. For example, one shortcoming of the piece is that the present summary of factors did not rise to the level of rigor as formal systematic reviews (nor was it our intention to do so). Moreover, the SESPM is not exhaustive; rather it is intended to provide a flexible framework for additional research and program development moving forward. Another limitation of the present discussion can be seen in failing to conduct meta-regression or analysis; future scholarship may offer

very important confirmation or modification of the framework via such analyses. A notable limitation of our SESPM-based recommendations is the labor, time and resources necessary for education and training efforts; however, we argue that the cumbersome processes involved in many of the SESPM-based recommendations is ultimately worthwhile in the long run because multi-level suicide prevention efforts may save lives and improve quality of life beyond what is currently within the capabilities of public health and clinical mental health fields. Also, while the same limitations concerning time, cost and resources certainly apply to risk assessment tool development recommendations, we believe that the scientific progress in suicide prevention is not a question of experienced clinical rating vs. algorithm building, but both approaches mutually informing each other to create new insight.

We have articulated background, structure and recommendations for a SESPM. The bottom line of our perspective is that we agree with a sentiment that has been expressed in prior suicidology literature: scholars and practitioners alike need to expand how we think about suicide. The SESPM represents a valuable step in moving from a hyper-focus on individual-level suicide risk prediction toward a comprehensive multi-level perspective on suicide prevention. We welcome further dialogue, research and development moving forward.

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Depression, Hopelessness, and Complicated Grief in Survivors of Suicide

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Suicide often has a severe impact on the surviving family and friends. There is a need to better understand the psychological and psychopathological consequences of losing a significant other by suicide. The aim of the present study was to assess hopelessness, depression, suicide risk, complicated grief, intrusive memories, and avoidance in a sample of suicide survivors. In this observational study, 35 bereaved individuals were recruited at the Suicide Prevention Centre of Sant'Andrea Hospital in Rome. Individuals were administered a series of validated instruments: the *Beck Depression Inventory II* (*BDI*), the *Beck Hopelessness Scale* (*BHS*), the *Inventory of Complicated Grief* (*ICG*), the *Impact of Event Scale* (*IES*), the *Subjective Happiness Scale* (*SHS*), and the *Satisfaction With Life Scale* (*SWLS*). Most survivors (62.8%) obtained high scores on measures of complicated grief. Scores on the measure of complicated grief were associated with intrusiveness of thoughts and memories, attempts to prevent the thoughts and emotions related to the event, depressive symptoms and hopelessness, and lower scores for feelings of happiness and satisfaction with life. A subgroup of suicide survivors may be at risk of severe psychological distress and suicidal behavior. Identification of these survivors is a necessary step for providing appropriate counseling and psychotherapy.

Keywords: complicated grief, depression, hopelessness, suicide, survivors

INTRODUCTION

Suicide is a major public health problem, with more than 800,000 individuals dying by suicide annually (World Health Organization [WHO], 2014). It is estimated that for every suicide there are 6–10 people bereaved by the death (Cerel et al., 2008; Andriessen and Krysinska, 2012). In total, about 4.3% of the population has experienced a suicide in the past year, and 21.8% during their lifetime (Andriessen et al., 2017b). Hence, the population of suicide survivors, that is, the family members, friends, and others (e.g., colleagues, classmates, clinicians) who have lost someone by suicide, is the largest community of victims in the area of mental health related to suicide (Shneidman, 1969; Andriessen et al., 2017a).

Whereas grief is a normal, purposeful reaction to a loss, it is estimated that 7–10% of bereaved individuals may experience a condition known as "Complicated Grief" (Stroebe et al., 2013;

Zisook et al., 2014; Shear, 2015). It is also referred to as Prolonged Grief Disorder (Prigerson et al., 2009), and more recently as Persistent Complex Bereavement Disorder (Robinaugh et al., 2014), a condition for further study. Although there is not yet a consensus about the exact set of diagnostic criteria and the name of the syndrome, it is typical of people who may experience major difficulties accepting the death of a significant other and its consequences. It is expressed through chronic, persisting characteristics of acute grief, and is more likely to occur after a sudden or violent death such as homicide or suicide (Lobb et al., 2010; Shear, 2015).

Some clinical characteristics of complicated grief may resemble symptoms of depression and post-traumatic stress disorder; however, there are a number of specific symptoms that allow reliable identification of complicated grief distinct from other disorders (Boelen, 2013; Stroebe et al., 2013; Zisook et al., 2014). Typical symptoms of complicated grief include intense yearning and longing for the deceased, intrusive thoughts or images about the deceased, rumination and intense feelings of anger and guilt (e.g., the feeling that they should have prevented the death), avoidance of situations, people and places that remind of the deceased, and difficulty finding meaning in life (Prigerson et al., 2009; Zisook et al., 2014; Shear, 2015). The bereaved individuals may feel numb and experience a diminished sense of self (Prigerson et al., 2009; Shear, 2015). Importantly, family and friends may become frustrated in their efforts to support the bereaved individual, which may increase their feelings of isolation and inadequacy (Shear, 2015).

Complicated grief may be associated with considerable morbidity, such as risk of cancer, cardiac events, sleep disturbances, and alcohol and substance abuse (Prigerson et al., 1996, 1997; Chen et al., 1999; Prigerson and Jacobs, 2001; Zisook et al., 2014). In addition, it is a risk factor for major depression, anxiety disorders, and suicidal ideation and behavior (Mitchell et al., 2005; Shear and Skritskaya, 2012; Zisook et al., 2014). Unlike the symptoms of reactive depression to bereavement, the symptoms of complicated grief can persist even after treatment with tricyclic antidepressants (Pasternak et al., 1991; Prigerson et al., 1996).

Longitudinal studies have shown that women are more at risk of depression, but not of complicated grief, after a loss by suicide than men (Saarinen et al., 2000; de Groot and Kollen, 2013). While levels of depression and grief symptoms can be elevated shortly after the loss, the risks of depression and complicated grief appear to decrease after the first year after the loss (de Groot and Kollen, 2013), and most symptoms have been found to disappear within 3 years after the loss, on average (Saarinen et al., 2000) or between 3 and 5 years (Feigelman et al., 2008–2009), indicating that risks of ill-mental health may subside after 3 years.

It is well-documented that those bereaved by suicide who experience high levels of functional and social impairments, and psychological distress, also experience barriers to help-seeking (Provini et al., 2000; Dyregrov, 2002). Depression/lack of energy, and lack of information about helpful resources have been identified as major barriers, whereas mental health professionals, amongst a variety of other helping professionals, have been experienced as most helpful by the bereaved

(McMenamy et al., 2008). Given the potentially devastating effects of complicated grief on those bereaved by suicide it is crucial to assess their mental health.

Aims

The study aims to assess the mental health of suicide survivors, i.e., their levels of complicated grief, comorbid depression and hopelessness, and suicidal ideation. The study will look at sex differences, time since loss (≤3 years vs. >3 years), and type of relationship (nuclear family vs. other relatives and friends). To the best of our knowledge, no such study has been conducted in our country; hence, the study was designed as a pilot study to test the feasibility of such assessment within a suicide prevention unit based in a hospital environment.

MATERIALS AND METHODS

Sample

The Suicide Prevention Centre in Rome at Sant'Andrea University Hospital is a unique service in Italy, offering support for suicidal individuals as well as for those bereaved through suicide. Study participants were recruited between January and November 2014 through the bereavement support program, which includes participation in a psychological autopsy (Shneidman, 1981) to better understand a suicide death, and as a means of bereavement support. Participants were eligible if they were 18+ years old, and had lost at least one family member or close friend by suicide. Exclusion criteria were any psychiatric diagnosis in their medical history that could impair the evaluation of variables for the purpose of this study.

Thirty-five (17 males, 18 females) bereaved individuals participated in the study. The average age of participants was 47.3 years (range: 23–68; $SD = 12.4$). Two out of three participants (69%) were a first-degree family member of the deceased (partner, parent, son, sibling); the remaining were other relatives or friends. The majority (80%) had experienced one suicide loss, and the sociodemographic characteristics of the sample are reported in **Table 1**. Participation in the study was voluntarily, and each participant provided written informed consent; they were assessed in their living environment. Initially part of a dissertation project, the study protocol received ethics approval from the local research ethics review board.

Measures

Clinical and sociodemographic characteristics of the sample were drawn from medical files independently by two researchers using a checklist, and the data were compared for possible inconsistencies. All the participants were administered Italian versions of the *Beck Depression Inventory II* (*BDI-II*) (Beck et al., 1996; Ghisi et al., 2006), the *Beck Hopelessness Scale* (*BHS*) (Beck et al., 1974; Pompili et al., 2007, 2009; Innamorati et al., 2013), the *Inventory of Complicated Grief* (*ICG*) (Prigerson et al., 1995; Carmassi et al., 2014), the *Impact of Event Scale* (*IES*) (Horowitz et al., 1979; Pietrantonio et al., 2003), the *Subjective Happiness Scale* (*SHS*) (Lyubomirsky and Lepper, 1999; Iani et al., 2014),

TABLE 1 | Sociodemographic characteristics of the sample (*n* = 35).

Variables	Frequencies (%)	Mean *(SD)*
Women	18 (51.4)	
Men	17 (48.6)	
Age	–	47.34 (12.39)
Years since the loss ≤ 3	13 (37.1)	
Degree of kinship with the deceased		
Partner	3 (8.6)	
Parent	9 (25.7)	
Son	9 (25.7)	
Sibling	3 (8.6)	
Other relative	9 (25.7)	
Friend	2 (5.7)	
Number of suicides among relatives and friends		
1	28 (80.0)	
>1	7 (20.0)	

and the *Satisfaction With Life Scale* (*SWLS*) (Diener et al., 1985; Pavot et al., 1991; Di Fabio and Gori, 2015). Cronbach alphas for the present sample are reported in **Table 3**.

The BDI-II (Beck et al., 1996) assesses the presence and severity of depressive symptoms according to DSM-IV criteria. A total score of 0–13 is considered as the absence of or minimal depression, 14–19 mild depression, 20–28 and 29–63, respectively, moderate and severe depression. Good estimates of internal consistency and concurrent validity have been demonstrated for the Italian version of the BDI-II (Ghisi et al., 2006).

The BHS (Beck et al., 1974) evaluates the presence of despair and negative expectations about the future (examples of items, "I look forward to the future with hope and enthusiasm" [reverse scored], "My future seems dark to me") and indicates the risk of suicide (Beck et al., 1985; Beck and Steer, 1988). Scores range from a minimum of 0 to a maximum of 20, with higher scores indicating more severe hopelessness. A cut-off score of 9 indicates the presence of severe hopelessness.

The ICG (Prigerson et al., 1995) assesses indicators of pathological grief (examples of items, "I feel lonely a great deal of the time ever since he/she died," "I hear the voice of the person who died speak to me"), such as anger, disbelief, and hallucinations. Higher scores indicate the presence of more severe pathological grief, and scores of 25 and higher indicate important difficulties in daily life associated with the memories of the event.

The IES (Horowitz et al., 1979) measures current subjective distress related to a specific event using the dimensions of intrusion and avoidance (example of items, "Any reminders brought back feelings about it").

The SHS (Lyubomirsky and Lepper, 1999) is a four-item scale measuring subjective happiness (example of items, "Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you?") with higher scores indicating greater happiness.

The SWLS (Diener et al., 1985; Pavot et al., 1991) is a five-item instrument assessing satisfaction with one's own life (example of items, "In most ways my life is close to my ideal"). Higher scores indicate greater satisfaction with life.

Analysis

All the analyses were performed with SPSS for Windows version 17. Correlations between variables were reported as Spearman *rho* correlations coefficients. Partial correlations between pairs of variables were computed while controlling for sociodemographic variables (age, sex, time since loss, and number of losses from suicide). Mann–Whitney *U*-tests were used for comparisons between groups (>3 years vs. <3 years from the loss, and 1 loss vs. >1 losses from suicide).

RESULTS

Mean time since loss was 3.20 years (*SD* = 1.41; median = 3; interquartile range = 3). **Table 2** presents the results from the psychological tests. More than 51% of the sample reported severe hopelessness, 28.6% moderate to severe depression, and 62.8% indicated difficulties in daily life associated with the memories of the event. Neither time since loss nor number of losses from suicide were significantly associated with psychological variables (all Mann–Whitney tests were non-significant; $p > 0.05$). Nevertheless, we calculated partial correlation coefficients among psychological variables also controlling for these variables. The presence and severity of complicated grief was associated with more intrusive thoughts and memories ($\rho = 0.60$; $p < 0.01$) and avoidance of thoughts and emotions related to the event ($\rho = 0.42$; $p < 0.05$), more severe depression ($\rho = 0.53$; $p < 0.01$) and hopelessness ($\rho = 0.54$; $p < 0.01$), and less subjective happiness ($\rho = -0.60$; $p < 0.01$) and satisfaction with life ($\rho = -0.57$; $p < 0.01$) (see **Table 3**). Partial correlations indicated that age and sex did not mediate the relationships of complicated grief with other psychological variables, while the inclusion in the analyses of the number of losses from suicide was able to mediate partially these relationships. The inclusion

TABLE 2 | Psychological characteristics of the sample (*n* = 35).

Variables	Percentages	Mean *(SD)*
IES Intrusion	–	10.14 (4.69)
IES Avoidance	–	8.09 (4.38)
ICG	–	28.29 (15.37)
ICG > 25	62.8	–
BHS	–	9.00 (5.25)
BHS ≥ 9	51.4	–
BDI	–	14.71 (10.37)
BDI ≥ 20	28.6	–
SHS	–	15.37 (5.11)
SWLS	–	18.89 (7.96)

IES, Impact of Event Scale; ICG, Inventory of Complicated Grief; BHS, Beck Hopelessness Scale; BDI, Beck Depression Inventory II; SHS, Subjective Happiness Scale; SWLS, Satisfaction With Life Scale.

TABLE 3 | Correlations between complicated grief and other variables (n = 35).

	ICG	Intrusion	Avoidance	BHS	BDI	SHS	SWLS
ICG	–	0.60** (0.60[1];0.60[2]; 0.58[3];0.54[4])	0.42* (0.42[1];0.42[2]; 0.40[3];0.34[4])	0.54** (0.54[1];0.54[2]; 0.53[3];0.57[4])	0.53** (0.53[1];0.52[2]; 0.50[3];0.54[4])	−0.60** (−0.60[1];−0.60[2]; −0.59[3];−0.67[4])	−0.57** (−0.57[1];−0.57[2]; −0.57[3];−0.60[4])
Cronbach alpha	0.93			0.88	0.91	0.81	0.92

**Correlation is significant at the 0.01 level (two-tailed); *correlation is significant at the 0.05 level (two-tailed). Partial correlations controlling for: [1]age; [2]age and sex; [3]age, sex, and time since the loss, and number of losses through suicide. IES, Impact of Event Scale; ICG, Inventory of Complicated Grief; BHS, Beck Hopelessness Scale; BDI, Beck Depression Inventory II; SHS, Subjective Happiness Scale; SWLS, Satisfaction With Life Scale.*

of number of losses from suicide attenuated the relationships of complicated grief with intrusion (ρ from 0.60 to 0.54; $p < 0.01$) and avoidance (ρ from 0.42 to 0.34; $p < 0.05$) of thoughts and emotions related to the event, and amplified the inverse relationship between complicated grief and subjective happiness (ρ from −0.60 to −0.67; $p < 0.01$). Small changes in the magnitude of the relationships when the number of losses from suicide was included in the analyses were evident also for the association between complicated grief and hopelessness and depression.

DISCUSSION

The present study explored the mental health of bereaved individuals who had lost a significant other to suicide. The study revealed that 63% of those bereaved had elevated scores on a measure of complicated grief, and that complicated grief scores correlated moderately but positively with depression and hopelessness and negatively with subjective happiness and satisfaction with life. Most of the participants experienced high levels of depression and hopelessness, fewer positive expectations for the future, major symptoms of complicated grief, accompanied by lower perceived life satisfaction.

These findings shed light on a vulnerable population far greater than the number of suicides, i.e., those who experience a painful grief process. The cross-sectional nature of the study does not permit conclusions about the causes of the distress, yet it is apparent that distress can be present even many years after the death. Recently, scholars (Feigelman et al., 2018) reported how pervasive suicide exposure and bereavement is, pointing to a far greater percentage of individuals being touched by such phenomenon. These authors pointed out that suicide bereavement may affect up to more than a third of the US population.

These survivors may be at increased risk of suicidal behavior, and their identification by means of validated instruments is a first crucial step in order to facilitate appropriate psychotherapeutic support (Shear et al., 2005; Wittouck et al., 2011).

The high levels of symptoms of complicated grief, even several years after the death, as well as the significant association between the level of complicated grief and the level of intrusiveness and avoidance on the IES scale, which are characteristic of PTSD, suggest that, in the case of suicide, it is hard for the bereaved to achieve a level of acceptance and emotional balance (Maciejewski et al., 2007). In addition, the entire sample presented high levels of hopelessness is only pointing to reduced future expectations. Beck et al. (1996) reported that hopelessness is a better predictor of fatal and non-fatal suicidal behavior than depression. Although, hopelessness is only a proxy of suicide risk, we found that more than half of the participants had such risk. This finding confirms research results which have found an increased risk of suicidal behavior among family members who have experienced the suicide of a significant other (Pitman et al., 2014, 2016). It is important, therefore, to provide psychiatric screening for those bereaved by suicide as well as to support caregivers who deal

with suicidal individuals (McLaughlin et al., 2016). If survivors were to participate in treatment, they could expect to experience benefits, such as lower levels of complicated grief, depression, and a higher perceived quality of life (Shear et al., 2005; Wittouck et al., 2011).

Research into the effectiveness of suicide bereavement support suggests that there is no 'one size fits all.' Those bereaved who are in need of sharing their experiences and finding social support appear to benefit from participation in support groups, whereas those who struggle with psychiatric or psychological issues might be better served through psychotherapy (McIntosh, 2017). Systematic reviews of the literature have found modest, yet positive evidence of effectiveness of group and family interventions regarding dealing with grief, depression and other mental distress (McDaid et al., 2008; Szumilas and Kutcher, 2011).

Obviously, the provision of therapeutic support in an individual case will depend on the scholarly background of the therapist, the needs of the bereaved, their social support and family context (Andriessen and Krysinska, 2016). It is, however, advised that therapy for individuals or families would be provided in a supportive and educational climate. An involved, humanistic, compassionate approach would be preferred to overly directive or passive approaches. Assessment, addressing grief reactions and the creation of a 'suicide story' have been identified as crucial therapeutic aspects (Andriessen and Krysinska, 2016). Working with those bereaved by suicide may be emotionally demanding for the psychotherapist. Hence, professional education, peer counseling, or supervision for those therapists may be indicated (Castelli Dransart et al., 2017).

The present study did have some limitations, including its cross-sectional nature, a small sample size, and lack of comparison group which may over-represent the impact of survivorship and related symptoms. However, we observed that those bereaved by suicide are often ambivalent about their willingness to share their experiences with health professionals. Those bereaved may be a silent and hidden population. Hence, even the exploration of small samples can contribute to a better understanding of their mental health. Another limitation relates to the fact that we did not have access to information regarding the pre-suicide psychological status of the bereaved nor was a psychiatric assessment performed through clinical interview or structured diagnostic interview. Furthermore, some individuals had looked for mental health assistance, and this may have biased the percentages and the reporting of symptoms. We also acknowledge the lack of a control group which would have provided more solid results for this observational study.

Despite these limitations, the results point to the need to further study the phenomenology of complicated grief in suicide survivors. Further studies may include larger samples and control groups (bereaved by non-suicide deaths as well as non-bereaved controls). Also, measurements before and after participation in the support program may further improve our insights in the needs of the bereaved and the support offered. The current study has shown that it is possible to assess the mental health, including depression and complicated grief, of people bereaved by suicide at a Suicide Prevention Centre. Such an assessment may facilitate help-seeking among those bereaved who are vulnerable for adverse mental health outcomes and suicidality.

AUTHOR CONTRIBUTIONS

MP provided the design of the study. SB, DE, and MM collected the data and provided first draft. AF, DL, GS, and KA contributed to the drafts and interpretation of the results. MI provided the statistical analysis. All authors contributed in drafting the final version of the paper.

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Medical Students and Suicide Prevention: Training, Education, and Personal Risks

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Exposure to suicidal patients is widespread among psychiatrist and psychiatric nurses, but also among general practitioners, emergency clinicians, and nurses (Palmieri et al., 2008). Patients who attempt suicide are more likely to have contact with their primary care provider than a mental health provider in the month before attempting suicide (Lake, 2008). Hence, it will often be up to medical personnel, beyond psychiatrists, to encounter suicide attempters. Regrettably, depression and the related risk for suicide are still largely underrecognized in primary care settings and emergency rooms (Lake, 2008). To improve diagnostic skills and competency in suicide ideation (SI) assessment, specific training is needed because it could greatly contribute to suicide prevention (Palmieri et al., 2008). Educational strategies to increase SI assessment performance should be available to all professions involved in general and psychosocial patient care (Mospan et al., 2017), starting from medical and residency schools.

These educational strategies usually address theoretical and technical skills, but a complementary facet deserving attention is attitude toward suicide. Therefore, besides increasing theoretical competency in depression and suicide risk assessment, there should be also a specific focus on medical students' and clinicians' attitudes toward these constructs. Attitudes may have a dual root: one related to clinical experience, and the other to personal experience.

Regarding the first, the majority of health professionals have unfavorable attitudes toward patients' self-harm, which might compromise their therapeutic endeavors and outcomes. Several studies have investigated this topic in medical students, using different tools (Oncü et al., 2008; Palmieri et al., 2008; Yousuf et al., 2013; Chan et al., 2014; Hashimoto et al., 2014; Nebhinani et al., 2016), and have suggested an association between medical students' attitudes toward suicide and appropriate therapeutic responses to suicidal individuals (Hashimoto et al., 2014). Students' knowledge and attitudes toward suicide have been described as changing during the years of training. Sato and coworkers assessed medical students in their first, third, and fifth year, with multiple-choice questions. In the knowledge part, only about half of the items were answered correctly; a significant difference was observed in students' attitudes, with sympathetic comments increasing, and critical comments decreasing, along with student years (Sato et al., 2006).

As far as personal experience is concerned, it has been suggested that attitude toward patients' depression and suicidal behaviors may also be related to depression and suicide risk among medical students and practitioners. A growing body of literature documents high rates of burnout, depression, and suicidal ideation among physicians and medical students (Torre et al., 1999, 2000, 2001; Rotenstein et al., 2016). Many medical students experience distress during medical school: the training process and environment themselves could contribute to the deterioration of students' mental health (Brazeau et al., 2014), and a relationship between burnout and suicidal thoughts has been suggested (van der Heijden et al., 2008).

A recent review and meta-analysis reported that the summary estimate of the prevalence of depression or depressive symptoms among medical students was 27.2% and that of suicidal ideation

was 11.1% (Rotenstein et al., 2016). Nonetheless, only 15.7% of depressed medical students sought psychiatric treatment (Rotenstein et al., 2016). Puthran et al. (2016) reported similar rates for depression (28%) and proportion of treatment-seeking depressed students (12.9%), but a lower mean frequency of suicide ideation (5.8%). Another study identified older students and those of lower socio-economic status as the main target of suicide intervention programmes and depression counseling (Fan et al., 2012).

What described above, as regards both clinical and personal experience, unveils another relevant problem, i.e., stigma. While psychiatrists may be familiar with this construct in their clinical experience, they may be less aware of its impact on treatment-seeking behaviors in the category of medical students and workers. Actually, strong concerns about stigma, confidentiality, adverse effects on residency application, and potential career impact have been reported. These may lead to barriers to mental health treatment, and explain the low rate of students seeking psychiatric treatment despite screening positive for depression reported above (Puthran et al., 2016; Rotenstein et al., 2016). Another contribution to barriers to seeking appropriate care include inadequate education about causes, effects, and treatment, unwillingness to take the needed time, and limited financial resources to pay for care (Reynolds and Clayton, 2009; Downs et al., 2014).

It is worrisome that many students share beliefs like the following: that revealing depression could negatively affect their professional advancement (Wimsatt et al., 2015); that if they were depressed their opinions would be respected less; that they would be considered unable to handle their responsibilities, and "less intelligent" (Schwenk et al., 2010). These beliefs have been reported to differ by sex; for instance, men have been found to agree more commonly than woman that depressed students could endanger patients (Schwenk et al., 2010). A US study identified three constructs underlying stigma: personal weakness, public devaluation, and social/professional discrimination. Students associating personal weakness with depression perceived medication as less efficacious and the academic environment as more competitive (Wimsatt et al., 2015).

The stigma problem deserves to be addressed, since as medical students and physicians confront depression and suicidality in their peers, they may become more likely to recognize and treat these conditions in patients, including colleagues (Center et al., 2003). Albeit it may not reflect objective measures of competency, a survey of Australian medical students found an association between greater personal experience of suicide and previous contact with patients with psychiatric problems and both increased perceived comfort and increased confidence in providing care for individuals with suicidal thoughts or behaviors (Patel et al., 2016). On the other hand, Chan et al. (2014) found that less exposure to suicidal people through clinical experience was associated with greater stigma and increased intentions of informal help seeking on behalf of students, while those who normalized suicide had significantly lower intentions of seeking help for thoughts of suicide. According to these two studies, greater personal experience of suicide and more exposure to

patients with psychiatric problems and suicidal behaviors may have a two-fold impact: on the one hand it could increase confidence in providing care to patients (Patel et al., 2016) and decrease stigma (Chan et al., 2014), while on the other it could lead to an enantiodromic attitude ("normalization" of suicide) and to a decreased intention of help seeking for personal problems including suicidal thoughts (Chan et al., 2014).

Briefly, further studies assessing suicide prevention curricula and interventions aimed at raising mental health literacy levels are warranted (Hawgood et al., 2008; Yousuf et al., 2013; Cheng et al., 2014) to increase awareness of depression and to destigmatize help-seeking in order to prevent suicide (Reynolds and Clayton, 2009; Moutier et al., 2012), both in the overall population of patients, and specifically in the medical students' and clinicians' category.

A question emerges here about how to properly approach these complex issues. According to what has been described above, personal experience alone is not enough, as well as the clinical one. Training and theoretical education may not be enough as well.

Some suggestions can be found in the archetype of the wounded healer (Guggenbühl-Craig, 1999), which teaches that within the physician there is the healer as well as the patient. Mythological references to this phenomenon include Aesculapius's teacher, Chiron, who suffered from incurable wounds (Greece), and Kali, goddess of pox but curer as well (India). Nonetheless, while "Knowing your own darkness is the best method for dealing with the darknesses of other people" (Jung, 1973), it is not enough: "who bears a wound could better empathize, who has experienced a similar sufference could better understand, but the wounded healer embodies a different type of consciousness" (Torre, 2010).

This "different type of consciousness" is not easy to achieve. In one of his Letters, Carl Gustav Jung wrote: "You can learn a great deal of psychology through studying books, but you will find that this psychology is not very helpful in practical life," because you need "not only a piece of knowledge, but a certain wisdom of life." Wisdom of life "does not consist of words only but chiefly of experience": "If such a thing can be taught at all, it must be in the way of a personal experience of the human soul. Such an experience is possible only when the teaching has a personal character, namely when you are personally taught and not generally."

It clearly emerges the need of a thorough approach encompassing both knowledge and attitude, with the two-fold purpose of increasing competencies and allowing a reflection on personal attitudes and emotions. In the field of education, it is widely acknowledged that communication and sharing of feeling-related subjects are complex to characterize. They belong to the field of personal knowledge (attitude), rather than to that of theoretical and practical knowledge (know that and know-how). While advances in the teaching of technical knowledge are going at the same pace of technical innovation itself, the same cannot be stated for the field of personal knowledge (Torre, 2007; Torre et al., 2017). Wilfred Bion realized that, contrary to technical issues, which are easy to share and teach, only limited methods exist to

communicate emotional experiences. In this field, a mimetic approach is not only worthless, but also dangerous because it might resemble a spurious appearance of growth (Bion, 1948).

Our Psychiatry School has a longstanding experience in the education and training of medical students and clinicians, and also in the counseling of students (a free Counseling service for students exists in Our University since 1988, when it was founded by Eugenio Torre). The theoretical root of our approach is the method Eugenio Torre developed trying to find a possible answer to the unresolved question raised by Bion. This innovative approach uses dynamic images (full length movies or scenes) from cinematic fiction as educational incitements, and combines theoretical and technical issues together with the experience of working in a group, also with the use of role play (Torre, 2007; Gramaglia et al., 2013; Zeppegno et al., 2015, 2017; Torre et al., 2017).

Approaches as arts-based therapy (including cinema among the arts) and role play, can be used as a valuable means of expression and exploration of feelings, to enhance personal growth and change, acting more on an emotional level than an intellectual one. Moreover, such approaches have the potential to help the individual grow in self-awareness while feeling relatively "safe" and protected by the safeguard distance offered by a movie or movie scene or by the role play (Izod, 2000). This feeling of being relatively "safe" may be particularly important when discussing about suicide.

Some Authors have used simulation and standardized patients or actors to approach the complex topic of suicidal behaviors (Fiedorowicz et al., 2013; Foster et al., 2015), nonetheless we believe that interactive learning techniques with the direct involvement of students may be particularly relevant to educate about complex topics which elicit strong personal and emotional responses, as is the case for suicidal behaviors. Actually, our experience is that role play with students and trainees in the role of both patients and clinicians has a great potential to enhance reflection about their emotions and improve their communication skills.

As we have tried to outline in this paper, there is still work to do in the education about suicide offered to medical students, clinicians and psychiatrists. While the gaps in theoretical and technical skills may be easier to fill, more attention should be paid to students' and clinicians' attitudes toward suicide, to the bi-directional relation between attitudes and experience (both clinical and personal), and to stigma. New educational approaches, complementary to the "traditional" ones, should be sought for this purpose, and we have briefly outlined our experience with the method proposed by Eugenio Torre. An approach including the arts (mythology, literature, cinema…), may represent for students and clinicians a privileged pathway to allow a reflection on the possibility of illness (including psychiatric illness), and death (including self-inflicted death), which are inherent in their human being. This may help develop that "different type of consciousness" described above: "Otherwise everything remains a clever intellectual trick, consisting of empty words and leading to empty talk (Torre, 2010)."

AUTHOR CONTRIBUTIONS

CG: performed the literature search; CG and PZ wrote the manuscript.

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Increasing Knowledge, Skills, and Confidence Concerning Students' Suicidality Through a Gatekeeper Workshop for School Staff

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Introduction: Around one-third of adolescents in Germany report a lifetime history of suicide ideation. School staff (e.g., teachers or school social workers) can serve as gatekeepers to identify adolescents at risk and transfer them to appropriate mental health professionals. The aim of this study was to evaluate a gatekeeper training for school staff.

Methods: A total of $N = 603$ school social workers, school psychologists, and teachers participated in one of 33 1.5-day workshops. Knowledge, attitudes, confidence in skills, and perceived knowledge were assessed at pre and post workshops and at 6-month follow-up (FU). Behavioral changes were assessed via self-report at FU.

Results: Knowledge, perceived knowledge, and confidence in own skills concerning suicidality increased significantly from pre- to post-assessment and was still significantly increased at 6-month FU. Attitudes toward suicidal adolescents were neutral to positive before the workshop and remained un-changed at FU. Overall, participants were very satisfied with the workshop. Although participants stated to be motivated to make behavioral changes at 6-month FU, they reported obstacles such as lack of resources and support from school administration.

Discussion: This 1.5-day gatekeeper workshop was effective in enhancing knowledge and confidence in school staff regarding suicidality. Future workshops would benefit from ongoing supervision and inclusion of school administration in order to facilitate long-term changes on a behavioral level.

Keywords: suicidality, gatekeeper, prevention, school staff, workshop, training

INTRODUCTION

According to the World Health Organization (WHO), suicide is the second leading cause of death among adolescents and young adults worldwide (World Health Organization, 2018). Although suicide rates are considerably small among adolescents compared to adults, suicide attempts and suicidal ideation are frequent in this age group. Around one-third of students in 17 European countries reported having had suicidal ideation at least once (Kokkevi et al., 2012), with slightly higher rates in Germany of 36.4–39.4% in school-based populations (Plener et al., 2009;

Donath et al., 2014). Suicide attempts are reported by around 7–9% of German high-school students (Plener et al., 2009; Brunner et al., 2014; Donath et al., 2014).

Gatekeeper programs as an approach to prevent adolescent suicides have gained popularity in recent years. Evaluation of gatekeeper programs consistently showed an increase in knowledge and confidence in school staff after attending gatekeeper trainings (for review: Katz et al., 2013; Robinson et al., 2013). One of the most commonly evaluated gatekeeper programs is *Question, Persuade, Refer* (QPR), a short (commonly 1.5–2 h) group-training catered to different types of gatekeepers (e.g., school staff and community workers). QPR has shown positive effects with regards to increasing knowledge and self-efficacy in gatekeepers concerning suicidal adolescents (e.g., Coleman and Del Quest, 2015; Hangartner et al., 2018; Litteken and Sale, 2018). However, changes in actual behavior in prevention staff (e.g., asking at-risk adolescents about suicidality) were not always significant (Wyman et al., 2008; Hangartner et al., 2018). With regard to changes in suicidal behaviors, in a large European study (Saving and Empowering Young Lives in Europe; SEYLE), on the rate of suicide attempts in adolescents did not change significantly after teaching QPR to teachers (Wasserman et al., 2015). When adding role-plays to standard QPR, Cross et al. (2011) were able to increase effect sizes of QPR by 0.44 of a standard deviation regarding observed behavioral changes in prevention staff at 3-month follow-up (FU). When comparing three gatekeeper trainings [QPR, RESPONSE (2-h school staff training), and the more extensive (2-day long) Suicide Interventions Skills Training (ASIST)], only participants of ASIST showed significant increases in asking at-risk youth about suicide following the training. The authors concluded that more extensive training, including role-plays and modeling, are crucial to changing behaviors in prevention staff (Coleman and Del Quest, 2015). These results are underlined by a recent study showing positive effects in behavior in prevention staff, but also knowledge and skills for Australian school staff when dealing with suicidal adolescents after having participated in the Skills-based Training on Risk Management (STORM), including role-plays and active skills learning (Robinson et al., 2016). In conclusion, Susanne Condron et al. (2015) showed that participants of longer gatekeeper trainings showed more behavioral changes in prevention staff as those participating in shorter trainings. However, to our knowledge, except for the SEYLE study (Wasserman et al., 2015), no study has so far assessed the effect of gatekeeper trainings for school staff on actual suicidal behaviors in adolescents.

Although gatekeeper interventions seem to be internationally applied in order to prevent adolescent suicidality, no such intervention had been established in Germany before this study on a larger scale. Based on results of previous research, a more extensive workshop (1.5 days) including role-plays and skills' training was implemented for school staff in Germany in our project. Significant increases in knowledge, perceived knowledge, confidence, as well as a significant reduction of negative attitudes were expected from before to after the workshop. These effects were expected to remain significant at 6-month FU. Furthermore, significant behavioral changes were expected at 6-month FU.

MATERIALS AND METHODS

Participants

Workshops were free of charge to all school psychologists, school social workers, and teachers in the state of Baden-Wuerttemberg, Germany. In Baden-Wuerttemberg, school social workers have been increasingly implemented at schools in the past 10 years. School psychologists are the contact person for (school-related) mental health issues for teachers, students, and parents. They work remotely and are usually responsible for a large number of schools. School psychologists also supervise and train "counseling teachers," who are regular teachers taking on an extra training. Counseling teachers have their office at the schools and set aside a certain number of hours a week from their teaching duties to counseling. School social workers are usually responsible for one to three schools (depending on their size) and usually have their office directly at the school, but are employed by external organizations. School social workers have more extensive training in mental health issues compared to counseling teachers. Apart from school social workers, counseling teachers, and external school psychologists, no other school welfare staff like school nurses exist.

Workshops were not compulsory and were advertised on the projects' homepage and by emailing schools in respective areas the workshops took place in. Participants had to actively enroll in the workshop. Usually, one or two participants per school enrolled in the workshop, although this was not regulated.

In total, $N = 603$ participants completed a voluntary pre–post assessment (each having participated in one of the workshops). Data of those $N = 603$ participants are presented in this paper. Of those participants, $N = 136$ (28%) completed a 6-month FU online assessment, to which all participants were invited via a letter and email. Participants who completed the FU assessment did not differ significantly from those who did not, with regard to gender, profession, years of professional experience, satisfaction with the workshop, or any of the other measures at post assessment ($p > 0.05$ for all variables).

The majority of participants were school social workers (59.5%), 25.3% were teachers, 6.6% were school psychologists, and 7.6% identified as "other" (e.g., priests teaching religion in schools, or social workers working part-time at a school and part-time a youth-welfare institutions). Most participants were female (79.5%), had more than 1 year of professional experience (91.4%), and had been in contact with a student presenting with suicidality (71.3%) at least once.

Workshop

In total, 33 workshops were delivered in different places around Baden-Wuerttemberg, Germany, between October 2014 and January 2018. On average, one workshop comprised 17 participants (min = 9, max = 32). The 1.5-day workshop was conducted by at least two presenters taking turns (one child and adolescent psychiatrist and three psychologists, all of which were licensed child and adolescent cognitive-behavioral therapists). All presenters had clinical experience in working with adolescents presenting with non-suicidal self-injury (NSSI) and suicidality.

The content of the workshop was adapted from workshops described by Robinson et al. (2008). Information presented in the workshop was derived from up-to-date scientific publications and clinical guidelines. On day 1 of the workshop, information on the epidemiology of suicidality and NSSI was given in a 1-h lecture. Afterward, the etiology of NSSI was conveyed by performing a stress test with the participants, video clips of adolescents with NSSI, and a 1-h lecture. In the afternoon, participants practiced in video-assisted role-plays on how to react to a student with NSSI. As an evidence-based method to enhance motivation for therapy in adolescents with self-harming behaviors, the method "Therapeutic Assessment" (Ougrin et al., 2009) was presented to participants in a 2-h session including a video clip and role-play. At the end of the day, basics of the stress tolerance skills training were presented and participants were able to try out skills themselves. On day 2, participants learned about the epidemiology and risk factors of suicidality, conveyed by a lecture, video clips, and self-directed learning. Afterward, participants practiced how to ask a student about suicidal thoughts in role-plays. As a last module, legal topics (e.g., when and how to involve parents or school administration) and worst case scenarios (e.g., when and how to call the police) were discussed, illustrated by case-reports and own experiences of participants. There was a clear separation of NSSI and suicidality throughout the workshop. Differences and similarities of both behaviors were stated, where applicable.

Although the workshop targeted both NSSI and suicidal behaviors, only results regarding suicidal behaviors are presented in this manuscript. For further details regarding results concerning NSSI and further details on contents of the workshop, see Groschwitz et al. (2017).

Measures

Participants completed questionnaires directly before (pre) and after (post) the workshop. They were also invited to participate in an online FU evaluation 6 months after the workshop. Measures for evaluation were derived from Kirkpatrick and Kirkpatrick's first three levels of their model for evaluation (*reaction, learning,* and *behavior*; Kirkpatrick and Kirkpatrick, 2006). *Reaction* was measured by participants rating their satisfaction with the workshop (29 items, Cronbach's alpha = 0.90). *Learning* is divided into the areas of knowledge (16 items, multiple-choice questions), perceived knowledge (eight items, Cronbach's alpha = 0.90), and confidence in own skills (eight items, Cronbach's alpha = 0.91) in Kirkpatrick and Kirkpatrick's model. At FU, participants indicated if they confident to identify suicidal adolescents or refer them to professional help and if they felt comfortable with asking a student about suicidality (I feel confident/comfortable vs. I do not feel confident/comfortable) and whether their handling of situations involving students with suicidal behavior had changed in the 6 months after the workshop on a day-to-day basis (five-point Likert-scale), and on how well they were able to integrate their knowledge on a school level (five-point Likert-scale; *Behavior*). In addition to this model of evaluation, changes in attitudes toward adolescents with suicidality (seven items, Chronbach's alpha = 0.82) were assessed, since this has shown to be relevant in previous studies (i.e., Heath et al., 2011). All items

(except for the knowledge test which consisted of multiple-choice questions) were rated on a five-point Likert scale (1 = fully agree to 5 = do not agree). For the knowledge test, answers were coded as 1 = correct and 0 = incorrect. A mean of correct answers [all correct and incorrect answers added up and divided by number of items (16)] was calculated. For example, a total score of 1 indicated 100% correct answers, while a score of 0 indicated 0% correct answers. A more detailed description of the evaluation tool was published by Groschwitz et al. (2017).

Statistical Analyses

Data were analyzed using the statistic software IBM SPSS Statistics, version 25. As participation in the FU assessment was rather low (28%), pre–post analyses (regarding knowledge, perceived knowledge, confidence in skills, as well as attitudes) were conducted for all $N = 603$ participants, including the between-subject variable "profession." Differences between all three time-points ($N = 132$) were calculated using a repeated measures analysis of variance (ANOVA) across all three time-points. *Post hoc t*-tests were performed. For significant differences, effect sizes (Cohen's *d, repeated measures*) were calculated.

Ethics

The study was carried out in accordance with the Declaration of Helsinki and was approved by the institutional review board of the University of Ulm.

RESULTS

Satisfaction With the Workshop

In general, participants were very satisfied with the workshop ($M = 4.8$, $SD = 0.3$; on a scale from 1 = not satisfied to 5 = very satisfied). They were most satisfied with the workshop leaders ($M = 4.8$, $SD = 0.3$) and the atmosphere ($M = 4.8$, $SD = 0.4$). Participants were also very satisfied with contents of the workshop ($M = 4.6$, $SD = 0.3$), time management ($M = 4.6$, $SD = 0.4$), as well as technical equipment ($M = 4.5$, $SD = 0.6$). Furthermore, 89.3% stated to definitely and 10.2% stated to most likely recommend the workshop to colleagues.

Pre–post Changes

Knowledge, perceived knowledge, and confidence in skills increased significantly ($p < 0.001$) from before to after the workshop. Furthermore, negative attitudes toward suicidal students decreased significantly (for details, see **Table 1**).

Differences Between Professions Regarding Changes From Pre- To Post-workshop

Between-subject effects regarding profession were calculated for changes pre- and post-workshop with regard to knowledge, perceived knowledge, confidence in skills, and attitudes (for details, see **Figure 1**). There were no significant differences with regard to increases in actual knowledge between professions

TABLE 1 | Data of pre–post assessment.

	M_{pre} (SD)	M_{post} (SD)	T	$d_{repeated\ measures}$
Knowledge	0.32 (0.18)	0.68 (0.17)	−37.6***	1.6
Perceived knowledge	2.9 (0.8)	3.9 (0.5)	−26.4***	0.9
Confidence in skills	3.0 (0.9)	4.1 (0.5)	−27.5***	0.9
Attitudes	1.8 (0.7)	1.4 (0.5)	11.4***	−0.5

***$p < 0.001$.

FIGURE 1 | Changes in knowledge, perceived knowledge, confidence in skills, and attitudes from before to after the workshop by profession. ***$p < 0.001$; n.s., not significant.
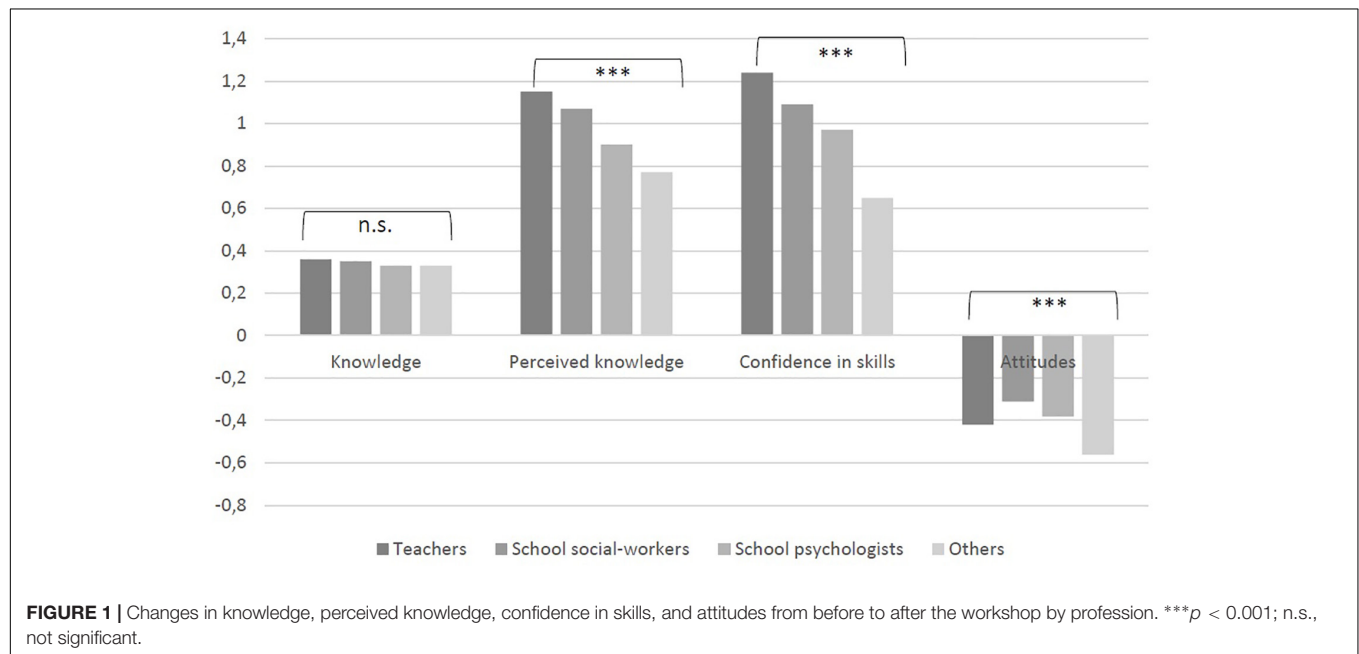
($F = 0.12$, $p = 0.94$). Increases in perceived knowledge and confidence in own skills differed between professions ($F = 3.73$, $p < 0.05$ and $F = 4.21$, $p < 0.05$, respectively), with teachers reporting largest increases, and "other" professions reporting smallest increases, followed by school psychologists. Decreases in negative attitudes also differed significantly between professions ($F = 4.2$, $p < 0.05$), with other professions and teachers showing largest decreases in negative attitudes, while school social-workers showed smallest decreases (for details, see **Figure 1**).

Follow-Up Assessment

Repeated measures ANOVAs showed significant differences between all three time-points (pre, post, and FU) for all measures (knowledge: $F = 161.4$, $p < 0.001$; perceived knowledge: $F = 240.3$, $p < 0.001$; confidence in skills: $F = 199.2$, $p < 0.001$; and attitudes: $F = 11.4$, $p < 0.001$).

Post hoc t-tests revealed significant increases in knowledge from pre to FU ($T = −12.6$, $p < 0.001$, $d = 1.9$), but also significant decreases in knowledge from post to FU ($T = 2.6$, $p < 0.05$, $d = −0.03$). Perceived knowledge increased from pre to FU ($T = −14.6$, $p < 0.001$, $d = 1.1$) and also decreased significantly from post to FU ($T = 4.9$, $p < 0.001$, $d = −0.5$). Confidence in skills increased significantly from pre to FU ($T = −15.0$, $p < 0.001$, 1.5) and did not decrease significantly from post to

FU ($T = 1.2$, $p = 0.23$). Attitudes were the same at pre and FU ($T = 0.00$, $p = 1.0$), which was due to a significant increase in negative attitudes from post to FU ($T = −2.5$, $p < 0.001$, $d = 0.5$; for details, see **Figure 2**).

At FU, 81.5% of participants stated they felt confident to identify students at risk, 92.6% felt comfortable asking a student about suicidality, and 85.9% felt confident in referring a student to professional mental health care.

Furthermore, 55.2% of all participants stated to have found the contents very useful for their daily work and 34.3% stated to have found them useful. The same was true for motivation to implement contents of the workshop, with 54.8% stating to be very motivated and 37.8% stating to be motivated. However, only 23.5% stated to have transferred those skills very successfully into their daily work, while 44.1% stated to have done so successfully, and 27.9% stated to have done so a little. Furthermore, 15.7% stated to have changed their behavior with regard to suicidal students very much, while 39.6% stated to have done so moderately, and 34.3% stated to have done so a little. Changes on a school level were only observed by 13.4% of participants. Only around a third of participants had shared the contents of the workshop with school administration (37.0%), or were working with school administration to change the way the school handled suicidal students (30.2%). In the same line, only 33.1% stated that school administration was open for new concepts
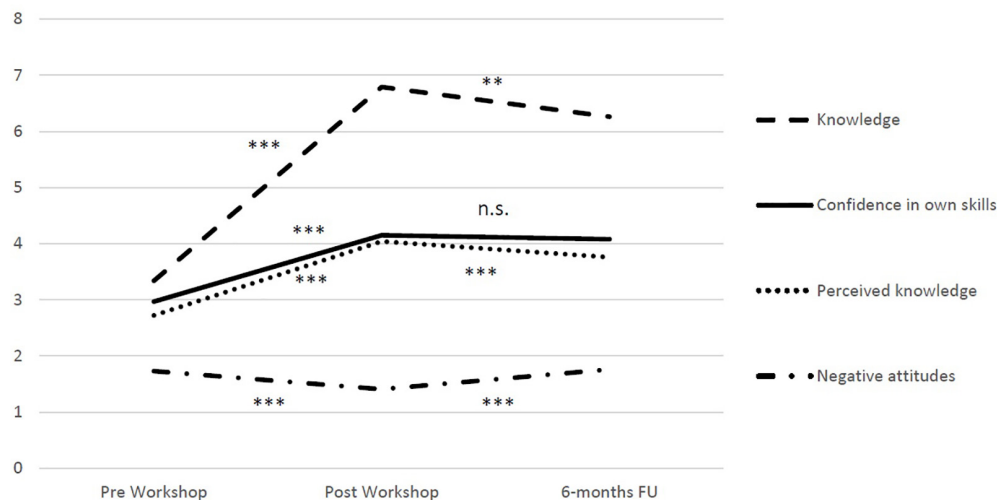
FIGURE 2 | Changes in knowledge, confidence in skills, perceived knowledge, and negative attitudes from pre to follow-up (FU). ***$p < 0.001$ and **$p < 0.01$; n.s., not significant; 6-months-Fu, follow-up at 6 months.

when dealing with suicidal adolescents, and only 29.2% reported sufficient timely resources to make changes at a school level.

DISCUSSION

Results of this study showed that a 1.5-day gatekeeper training for school staff can significantly change knowledge, perceived knowledge, and confidence in skills regarding student suicidality, with effects still being significant after 6 months. While negative attitudes toward suicidal students were reduced significantly directly after the workshop, attitudes returned to their original level at FU. Differential effects by profession of gatekeepers were found. Behavioral changes (assessed by self-report) showed moderate effects. Main obstacles for behavioral changes were identified by participants as a lack of support from school administration and timely resources.

In line with previous studies evaluating gatekeeper trainings for school staff, knowledge, perceived knowledge, and confidence in own skills were significantly increased by this workshop (Wyman et al., 2008; Hangartner et al., 2018). These changes are very important, as school staff are recognized as important gatekeepers for suicide prevention by the WHO (World Health Organization, 2012/2018). In a study asking adolescents about their help-seeking behaviors, teachers were named a source of help in the case of self-harm before mental health professionals or general doctors (Fortune et al., 2008). Factual knowledge, and especially perceived knowledge, can increase one's confidence in their own skills and can in turn enable a person to react and act appropriately in difficult situations.

Different from other studies (e.g., Wyman et al., 2008), negative attitudes toward suicidal adolescents were not reduced significantly at FU, even though they had significantly reduced directly after the workshop. One reason might be that attitudes were already quite positive before the workshop (1.8 on a scale

from 1 = not at all negative to 5 = very negative), which may have resulted in a ceiling effect. As participants had to enroll actively in the workshop, it is likely that mainly participants who did not hold negative attitudes toward those adolescents enrolled in the workshop, as they were interested in providing better care.

On the other hand, despite negative attitudes returning to their original level at 6-month FU, perceived knowledge and actual knowledge also decreased significantly from post to FU (although still significantly higher at FU than before the workshop). A lack of sustainability of effects of gatekeeper suicide prevention trainings has been found in several studies. Results of a qualitative study performing in-depth interviews and focus groups with gatekeepers suggest that (Shtivelband et al., 2015) implementing a social network where participants can stay in touch with other participants of the workshop and exchange experiences, continued learning (e.g., via additional online material), community outreach programs after the workshop, and reminders and ongoing communication might enhance sustainability of increased knowledge, and confidence in own skills.

Significant differences were found between the different professions (teachers, school social-workers, school psychologists, and "others") this training was delivered to. Presumably, teachers benefit most from the training, while other professions (who the workshop was not catered to specifically) and school psychologists had the least benefit. These results suggest to be specific in who to deliver the workshop to (mainly school social workers and teachers) and adjust contents to school psychologists (who usually have higher previous knowledge and skills) and other professions (who predominantly might work in different settings than schools).

Findings at 6-month FU have to be interpreted with care, due to the high drop-out rate. Even though participants who completed FU did not differ significantly from those who did

not on any socio-demographic variables or behavioral levels or satisfaction with the workshop at post-assessment, some possible biases might exist (e.g., participants who completed the FU assessment may have been involved in the topic on a more regular basis during the 6-month FU period or had more timely resources available to them).

One important effect at 6-month follow up was that almost all participants felt confident in identifying students at risk and in asking a student about suicidality. This is particularly important as a study by Carlton and Deane (2000) showed that students aged 14–18 years reported lower help-seeking intentions with increasing suicidal ideation. Therefore, it is important for gatekeepers to feel confident in actively identifying and consequently approaching students at potential risk for suicide.

While motivation was high to use contents of the workshop, the majority of participants had not transferred skills learned in the workshop into their daily work. One reason for this outcome might be that most participants (especially teachers) would not have to deal with suicidal adolescents on a day-to-day basis and may therefore not have used skills learned in the workshop frequently. However, this enhances the notion of continuous training after workshop completion (as suggested by Shtivelband et al., 2015), as knowledge and skills might decrease continuously over time, if not reinforced and practiced.

Another important obstacle of implementation of newly acquired skills, and especially of being able to spread knowledge and skills to colleagues at the school, seemed to be the lack of support from school administration and timely resources. It may therefore be viable for gatekeeper trainings (especially in the school system) to include and inform administration, in order to achieve highest possible support for participants. However, this might not always be feasible, as schools have to cope with many problematic issues (e.g., bullying or drug-abuse), and may not always regard suicidality as the most important issue.

Limitations

The major limitation of this study is that behavioral changes were only assessed in self-report and no objective measures (e.g., rate of suicide attempts) were assessed. As almost all participants worked at different schools, however, it was not feasible to assess those measures due to time and financial restraints. Furthermore, school authorities in Germany are increasingly reluctant to allow studies on suicidality in schools, although evidence clearly shows that such studies do not provoke suicidality in students or cause other harm (Gould et al., 2005; Lloyd-Richardson et al., 2015).

Another limitation is the drop-out rate at FU. However, participants at FU did not differ significantly from those who did not complete FU on any measure. There may still have been a bias of those participants who were still particularly engaged in subjects of the workshop at FU, to respond to the invitation. Therefore, results at FU have to be interpreted with care. Additionally, participation in the workshop was voluntary, which possibly favored motivated and interested school staff to participate and may have biased pre–post and FU results.

CONCLUSION

Participants of this 1.5-day gatekeeper workshop for school staff were highly satisfied and showed significant benefits with regard to knowledge, perceived knowledge, and confidence in skills. Most participants felt confident to identify a student at risk and approach them to ask about possible suicidal thoughts and behaviors at 6-month FU. As school staff are important gatekeepers in the prevention of adolescent suicide, gatekeeper workshops are recommended. However, future studies need to assess objective outcomes (like rates of suicidal ideation or suicide thoughts) in order to make broader recommendations. Future workshops should be catered to individual professions (i.e., separate workshops for teachers and school psychologists), in order to provide best possible benefits. Furthermore, participants would benefit from ongoing support after the workshop in order to sustain benefits in the long term.

AUTHOR CONTRIBUTIONS

RB, JS, and PP were involved in the design of the study. RB analyzed the data, performed statistical analyses, and drafted the manuscript. All authors were involved in obtaining data and delivering training, critically reviewed the manuscript, and gave their consent to the final version.

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Leveraging the Web and Social Media to Promote Access to Care Among Suicidal Individuals

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After two decades of exponential development, the Internet has become an inseparable component of suicide prevention matters. More specifically, social media has turned out to be a privileged space for suicidal individuals to express their distress and seek support. Although this tendency carries with it specific risks and challenges, it creates unprecedented opportunities to face the challenges of help seeking and access to care. In this paper, we present the empirical, technological, and theoretical evidence supporting the implementation of a digitally augmented prevention policy that would increase its reach. Congruent to the clinical observations and theories on the help-seeking process, we argue that social media can help undertake three main functions of increasing proactivity to bring suffering Web users to care. The gateway function relates to the properties of social media interactions to leverage help-seeking barriers and enable ambivalent individuals to access the mental healthcare system. The communication outreach function aims to broadcast pro-help-seeking messages, while drawing on the functional structure of the social media network to increase its audience. The intervention outreach function consists in using machine learning algorithms to detect social media users with the highest risk of suicidal behaviors and give them a chance to overcome their dysfunctional reluctance to access help. We propose to combine these three functions into a single coherent operational model. This would involve the joint actions of a communication and intervention team on social networks, working in close collaboration with conventional mental health professionals, emergency service, and community resources.

Keywords: suicide, prevention, Internet, online systems, social media, access to care, help seeking

INTRODUCTION

With a number of users that has exploded from half a million in 2000 to almost 4 billion in 2017 (Internet Live Stats, 2016), the advent of the Internet represents one of the most dramatic social and technological evolution of the last two decades. It has deeply affected the way we interact, communicate, and access information. With respect to suicide, literature increasingly

acknowledges the new or compounded threats but also original prevention opportunities that the Web has brought out (Durkee et al., 2011; Daine et al., 2013; Robert et al., 2015; Krysinska et al., 2017). This ambivalence was qualified as a "double-edged sword" (Tam et al., 2007; Robert et al., 2015). On the one hand, the Internet gave easy and immediate access to prevention information and help resources, fostering the development of peer-support communities. On the other hand, it gave pro-suicide websites visibility, paved the way for cyber-bullying, and increased dissemination of high suicide contagion risk content. The latest Web generation opened more optimistic perspectives for suicide prevention. The meta-restructuration, technological advances, and collaborative innovations it implies (Aghaei, 2012) represent a unique opportunity for prevention strategies not only to keep pace with the digital evolutions (Tam et al., 2007) but also to exceed them.

One of the most relevant prevention issues that the Web may help to address concerns access to care. Worldwide, 800,000 people still die by suicide each year (World Health Organization, 2014) and 3–16% of the population have had suicidal thoughts at least once (Nock et al., 2008). Research indicates that only 24% of suicidal individuals accessed mental healthcare in the month prior to their death (Ahmedani et al., 2014). While access to appropriate care is recognized as a crucial component of suicide prevention (Tondo et al., 2006; Campo, 2009; World Health Organization, 2014), barriers to help seeking appear to be stronger for vulnerable populations (Pirkis et al., 2003; Farand et al., 2004; Wu et al., 2010) and for those suffering from severe suicidal ideations and depressive symptoms (Reynders et al., 2015).

A growing number of authors have proposed using the Web and social media to overcome help-seeking barriers among suicidal individuals (Chan et al., 2017). Reasons why people who are suffering may decide against formal assistance can be categorized into four non-exclusive classes: (1) stigma barriers, in the form of public, perceived, or self-stigmatizing attitudes toward suicide, mental illness and mental healthcare, which often generate guilt, shame, self-blame, or inhibition; (2) structural barriers, such as accessibility, cost, visibility, or inconvenience issues; (3) psychological barriers, including lack of emotional competence, poor emotional expression, or excessive self-reliance; and (4) beliefs about care providers, encompassing concerns about confidentiality, trustworthiness, or competence (De Leo et al., 2005; Gulliver et al., 2010; Barker et al., 2011; Niederkrotenthaler et al., 2014). Social media promotes expression and interactions under the principles of anonymity and freedom of speech, and suicidal statements are frequent on the Web (Ruder et al., 2011; Sueki, 2015). Posting suicidal warnings on the Web could thus be interpreted as a more accessible, bearable, or affordable alternative to face-to-face help seeking (Gould et al., 2002; Michelmore and Hindley, 2012).

In this paper, we argue that public health could use social media advantageously to increase modern prevention policies. We propose a non-exhaustive description of available technological tools, epidemiological evidence, and theoretical concepts that could be relevant as a foundation for a Web-based strategy to promote and facilitate access to care for suicidal individuals. First, we describe the main functions that such a strategy could undertake, namely working as a gateway to healthcare, promoting help seeking via outreach communication and pro-actively bringing help *to* at-risk Web users via outreach intervention. Then, we propose a synergic integration of these three components in an operational, digitally augmented public health model.

THE WEB AS A GATEWAY TO FORMAL MENTAL HEALTHCARE

According to Rickwood et al. (2005), help seeking can be modeled as an active process requiring four sequential steps: awareness of the problem, expression of need for help, availability of support, and willingness to seek out help. These steps are distributed along a gradient of increasing motivation to action, which spans from personal contemplation to interpersonal solicitation. The four above-mentioned categories of help-seeking barriers specifically relate to different steps of this model. For instance, while psychological barriers reduce de propensity to realize and express emotional disturbances, structural barriers hinder the factual possibility to access healthcare. Stigma and beliefs about care provision negatively alter the approach/avoidance motivational balance for acting out (Rickwood et al., 2005; Gulliver et al., 2010; Luxton et al., 2011).

The various proposals to make the Internet a stepping stone to formal health are consistent with the sociological models that assume that help-seeking behaviors are mostly driven by interpersonal systemic determinants (Chan et al., 2017). The Gateway Provider Model, in particular, predicts that involving intermediary actors who know the community resources, interact with people who need help and refer them to appropriate services would enhance general access to care (Stiffman et al., 2004). Several properties of the Web suggest that online prevention interventions could endorse the role of gateway to reduce both structural and personal barriers to help. (1) Accessibility from almost any private or public place helps to skirt the constraints of distance from local services (Robert et al., 2015; Chan et al., 2017). It also facilitates discretion, which can alleviate interpersonal inhibitions to seek help. (2) Affordability compensates the structural barrier of cost and eases access to care for financially dependent individuals. (3) Timeliness guarantees access to support including outside work hours. It allows for attunement with the short timescale within which both severity of suicide ideation and motivation to ask for help can fluctuate (Miller, 2009; Luxton et al., 2011). (4) Anonymity and privacy are supposed to make the interaction less confrontational (Miller, 2009) and foster expression and self-disclosure (Chester and Glass, 2006; Krysinska and De Leo, 2007; Robert et al., 2015). (5) Impression of control comes with anonymity. It can secure individuals who cannot afford strong interpersonal commitment by giving them the opportunity to exit the conversation at any point (Robert et al., 2015).

This facilitation role, however, has its downside. Anonymity, in particular, severely hampers the possibilities of emergency interventions in case of imminent suicide risk. In addition, low

interpersonal commitment gives the therapeutic link a labile dimension, with an increased risk of losing connection with the person. The Web could thus be placed at the extremity of a continuum ranging from high access probability but limited therapeutic engagement and possibilities of actions, to lower spontaneous contact probability but greater interpersonal commitment and larger scope of interventions. Under this perspective, the gateway function of Web-based interventions should not be regarded just as an entryway but also as a way to engage and reinforce the patient's therapeutic commitment.

COMMUNICATION OUTREACH

As a first degree of proactivity, communication outreach consists in drawing on communication strategies to encourage suicidal individuals to use prevention services. Social media has opened new perspectives to the promotion of access to care. Beyond the simple setting up of passive websites, it offers to increase the outreach of prevention information. Literature has addressed two important related issues to inform communication strategies.

The first issue concerns the type of content that should be broadcasted to increase the probability that suicidal Web recipients will seek help. Indications come from "media effect studies" that have examined the impact of disseminating information on suicidal behaviors. In particular, Niederkrotenthaler et al. (2010) found that suicide stories can be linked to a significant decrease in suicide rates, provided that they respect some characteristics. The so-called "Papageno effect" has been described for reports of individuals who overcame a suicide crisis, but also suggested for similar fictional stories (Till et al., 2013; Notredame et al., 2017). Since numerous digital modules facilitate the broadcast of crisis-mastery stories to which suicidal individuals can identify (Luxton et al., 2012), spontaneous testimonials from celebrities or adolescents have flourished on social media (see, for example, Daoust, 2017; iamjordyndunlap, 2017). In terms of public health policies, the question is now about how to harness the collaborative nature and outreach potential of social networks to maximize the potential of preventive communication (Luxton et al., 2011). This would mean stimulating the production of such contents by both prevention stakeholders and lay Web users, but also structuring the creation process in an evidenced-based perspective. Several prevention organizations, such as Samaritans, have produced their own video storytelling depicting suicide survivors (Samaritans, 2017). In the same vein, Thiha et al. (2016) proposed to boost a school-based suicide prevention program with an interactive Web interface designed to help peer leaders make personal stories valuable contents to promote access to care.

The second issue has been raised by the applications of the network sciences to the field of suicidology. Two recent studies explored the architectural and dynamic properties of the networks formed by microbloggers who posted suicidal comments (Fu et al., 2013; Colombo et al., 2016) and led to similar observations. (1) The networks formed by suicide-posting microbloggers are characterized by a low density (i.e., low

number of effective connections regarding the virtual number of possible connections), but a high degree of interconnectivity (i.e., high number of reciprocal or triangle connections). While sparsity is supposed to increase the speed of dissemination of the information, the strong reciprocity between posters of suicidal messages suggests potential recursion of the information, thus augmenting the impact of the messages. (2) Some microbloggers play a key role in the networks. On the one hand, influential posters (*influencers)* are those microbloggers who have a lot of followers but few friends, and whose posts are widely spread over the network. On the other hand, *influential reposters (linkers)* have both a significant number of friends and followers, such that they bridge the small disconnected hubs of which the network is composed.

Although deserving replications, lessons could be drawn from these observations to build outreach communication strategies. The structural and functional properties of social media allow for fast dissemination of messages that may be received redundantly by users. This communication strength is versatile. On the one hand, it reinforces the reach and impact of suicide contents, thus majoring the risk of contagion. On the other hand, it could be an exceptional channel to broadcast and boost the influential potential of pro-help seeking messages; however, the optimization of a communication strategy on social media must be tightly tailored to the structure and function of the targeted network. For instance, involving *influencers* may be a relevant way to ensure the broadest dissemination of Papageno messages. *Linkers* could also be usefully recruited as gatekeepers because of their privileged position to detect and signal worrisome messages.

OUTREACH INTERVENTION

A significant proportion of suffering Web users may remain impervious to the gateway or communication outreach strategies, although clearly needing support. The only way to compensate for this strong "help-negation" (Rudd et al., 1995) would thus be to bring help directly to them and try to reduce the barriers to formal help seeking *in situ*.

For practical and ethical reasons, proactivity should remain proportionate to the actual risk level. Estimation of the probability that Web users will engage in suicidal behaviors is an essential perquisite for any intervention outreach. In the field of suicidology, several authors have proposed to use artificial intelligence to automatically segregate high-risk messages from the mass of potentially concerning posts published on Twitter® (Abboute et al., 2014; Homan et al., 2014; Burnap et al., 2015), Weibo® (Lv et al., 2015), or Facebook® (Thompson et al., 2014). The process includes four steps: (1) social media data are mined to extract the messages that contain one of a list of warning key words or expressions; (2) detected posts are decomposed in quantifiable functional linguistic features; (3) a statistical classifier is trained on a sample of pre-labeled posts to distinguish between high and low-risk messages (Thompson et al., 2014; Moulahi et al., 2017); and (4) the performance of the trained machine is tested against human coders. Depending on the feature sets and the nature of the classifier, authors have found precision

FIGURE 1 | Proposal for an integrative e-prevention model based on social media. The graphical network stands for the generic functional and structural relationships between Web users, whatever the type of social media. The magnified red lines and dots represent the network of users who post suicidal content, as described in Section "The Web as a Gateway to Formal Mental Healthcare." The e-prevention system has two components. The first operational team is in charge of the communication outreach strategy. Its function is to broadcast evidence-based prevention messages to promote help seeking. The communication plan includes universal messages disseminated indistinctly throughout the network (c1) and messages targeting suicidal Web users, possibly relayed by the network influencers (c2). The second operational team is composed of e-clinicians who conduct Web interventions and deliver referral services to distressed social media users. There are three ways for the intervention team to get informed of individuals who potentially need support (three input channels). The two first inputs are universal in that they can come from any point of the whole network: direct contact by suicidal individuals or relatives whose help-seeking process was enabled by the gateway function of the platform (i1); or detection of at-risk posters through data mining and machine learning procedures (i3). The last input is said to be targeted because it is known to be coming from the network of suicidal-posting users. It consists in reporting worrisome messages by network members, either ordinary users or linkers formally involved as gatekeepers (i2). In i2 and i3 cases, the intervention team reaches out to the identified individuals and queries their actual suicide risk and need for help. The intervention team has four main missions: (1) provide a first relief (counseling function); (2) activate and support the emergency services (dark blue pastille) whenever necessary (crisis function); (3) progressively increase the commitment of Web users in the help process (motivational function); and (4) refer Web users to the appropriate conventional healthcare services (yellow pastille). To carry out its missions, the intervention team can progressively switch from private text messaging (pink pastille) to interactive means requiring greater interpersonal commitment (such as vocal or videoconferencing – mauve pastille). Icons retrieved for www.flaticon.com.

rates (i.e., proportion of truly high-risk messages among those classified as such by the algorithm) ranging between 0.6 and 0.8% (Abboute et al., 2014; Homan et al., 2014; Burnap et al., 2015, 2017; O'Dea et al., 2015) and recall rates (i.e., number of truly high-risk messages picked out by the algorithm among the total number of high-risk messages in the sample) between 0.65 and

0.75 (Homan et al., 2014; Burnap et al., 2015, 2017; O'Dea et al., 2015).

The detection performance that has been reached so far led some authors to argue for implementation as a first step in an online outreach process (Robert et al., 2015; Chan et al., 2017). Literature offers numerous promising examples of Web-based

interventions to prevent suicide (Barak, 2007; King et al., 2015; Robinson et al., 2015, 2016b; Mokkenstorm et al., 2017). The goal is either to extend the conventional care system with online psychotherapy or support groups or to serve as an entryway to this system. An example is the Israeli SAHAR program, which consists of an online platform that enables distressed Web users to have synchronous or asynchronous online interactions with helpers (Barak, 2007). With a further degree of proactivity, the American Foundation for Suicide Prevention developed organized systematic screenings of US college students via self-administered online questionnaires. All students were able interact with a counselor via a secured website. In addition, high-risk students were reached by e-mail and urged to attend in-person evaluation and treatment (Haas et al., 2008).

Nevertheless, to the best of our knowledge, no author has proposed online gateway intervention on an ecological outreach basis, i.e., for individuals who did not spontaneously ask for help, nor participated to formal screening procedures. Outreach intervention adds two important operational challenges to those of more traditional Web interventions. (1) Efficient and respectful messages, typically focusing on personalization, solicitude, or sense of belonging (Whiteside et al., 2014) would have to be designed to start the conversation with potentially unwilling individuals. (2) Formal clinical techniques would have to be developed to progressively increase the commitment of Web users who are not convinced *a priori*. There is no standard for online counseling (Miller, 2009). Nevertheless, outreach interventions should integrate several recognized characteristics of Web communication. For instance, textual interactions give no access to para-verbal cues but open to new possibilities of narration and allow for a posteriori quality control (Miller, 2009). The time of the therapeutic e-relationship is also less constrained than face-to-face interactions. It can either be contracted as chatting supposes a certain degree of immediacy, or dilated as the Web user can delay its responses. Overall, outreach intervention would require laying the foundation of a crisis e-clinic that would integrate counseling, motivational therapy, technological solutions, and Web-based communication.

DISCUSSION

The Internet has become an intrinsic component of our social landscape and daily life. As such, it cannot be ignored when dealing with suicide prevention. We believe that conditions are met to leverage the Internet to address one of the major public mental health issues, namely access to care. More specifically, we propose a model that uses social media as a transitional tool to initiate and reinforce the connection between ambivalent suicidal individuals and the formal healthcare system. The model, presented in **Figure 1**, coordinates the three pro-help-seeking functions presented in this paper, i.e., gateway, communication outreach, and intervention outreach. It relies on the synergy of two operational teams, both taking action via the main community, network and microblogging social media platforms. The Web communication team is composed of community managers and e-communicators, i.e., Web specialists able to

design efficient communication campaigns tailored to the social media codes and constrains. They must prove a strong mastery of technological tools and specific skills in networking and social marketing. The Web intervention team consists of Web clinicians, either social workers, psychiatric nurses, psychologists, or psychiatrists. They should be specially trained in text-mediated counseling and crisis intervention, as well as in the use of social media technologies.

In practical terms, the model operates in two stages. The first stage consists in "phishing" suicidal Web users to create a first contact, either blindly (universal outreach) or after detection of worrisome posts (targeted outreach). The machine learning algorithms and the alerts of the gatekeepers allow the intervention team to directly approach the users who posted suicidal contents. Complementarily, the pro-Papageno campaign lead by the communication team gives an opportunity to incite mute suicidal Web users (also called "passive users") to spontaneously contact the intervention team. The second stage begins as soon as the contact is established. Let us assume that the intervention team has intercepted a tweet stating "*Life is meaningless. Goodbye*," and it has successfully created an interaction with its author via the Twitter private messaging service. The intervention team will then have to handle four complementary missions: (1) bring a first relief to the distressed Web user by providing active chat counseling; (2) evaluate the actual suicidal risk and mobilize the emergency services if necessary; (3) progressively increase the commitment of the Web user in the help process thanks to motivational support; and (4) refer the suicidal Web user as soon as possible to appropriate mental health services, possibly by scheduling the appointment for him/her. To achieve these goals, the modularity of the social media can be relevant and useful. The Web clinicians may prompt the patient's therapeutic engagement by progressively proposing interfaces of growing inter-personal involvement, switching from text-based interactions (e-mails and chat), to online call, video-conferencing, and finally formal face-to-face meeting.

Importantly, the model we propose should not be considered an alternative to the traditional mental healthcare system, but rather as potential that increases its scope, helps to reach typically inaccessible populations, and reinforces the alliance with patients. This implies close collaboration between the operational Web teams and both the emergency services and mental health professionals. The Web community resources are also integrated as a key component of the system. As outlined in the literature, Web users by far anticipated the involvement of mental health professionals in dealing with suicidal contents on social media (Robinson et al., 2016a; Chan et al., 2017). Notably, peer-support and peer-surveillance initiatives were formally fostered by several platforms that created dedicated reporting systems for concerning posts (Facebook, 2015; Twitter, 2018). In our model, Web users – either ordinary network members or *linkers* involved as gatekeepers – could play a role in informing about worrisome posts. Such collaboration is anchored on the principle of mutual support: while the intervention team assists Web users in helping distressed peers, signalers of suicidal messages help to carry out outreach interventions.

We acknowledge that our model could crystallize sensitive ethical concerns such as how to keep a balance between the duty of care for presumed at-risk posters who did not formally ask for help and the principles of freedom of speech or privacy (Eggertson, 2015; Robinson et al., 2016a). More generally, online interventions are still at their infancy, and guidelines related to confidentiality (Robinson et al., 2016a), clinical safety (Luxton et al., 2012), and acceptability (Barak, 2007) issues must still be developed (Christensen et al., 2002).

The efficacy of our model remains to be tested. Due to the specific challenges that both Web interventions and complex public health actions pose, such an evaluation would require research innovation. For instance, methods remain to be developed to deal with pseudonyms rather than actual identities in the sampling and follow-up procedures (Lai et al., 2014). Furthermore, any attempts to establish causality assumptions between the online global strategy and its putative impact on the population would require a special effort to combine high-standard designs on both the individual and population levels, with a thoughtful choice of distal, proximal, and intermediary outcomes. In that regard, *infodemiology*, a branch of epidemiology that uses digital meta-data (e.g., Google queries, number of tweets) as proxies for "real life" indicators, could be relevantly exploited (Jashinsky et al., 2014; Sueki, 2015). Finally, the combination of qualitative and quantitative methods would help gain insight on the intrinsic socio-psychological process that underlies the impacts of the system (Lai et al., 2014).

If proved efficient, our model could formalize a trend reversal in prevention policies. Rather than simply attempting to counteract the adverse effect of social media, it would be about using them as an opportunity to increase prevention strategies. We believe this would result in general efficacy improvement, organizational optimization, and possibly cost reductions.

AUTHOR CONTRIBUTIONS

C-EN conceived the original idea, conducted the review of literature, set of conceptual basis of the model, and led the writing of the manuscript. PG, NP, MM, and MW substantially contributed to the article by identifying relevant references, providing conceptual inputs, and helping with the writing of the manuscript. MS and GV supervised the general process.

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Looking to the Future: A Synthesis of New Developments and Challenges in Suicide Research and Prevention

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Suicide and attempted suicide are major public health concerns. In recent decades, there have been many welcome developments in understanding and preventing suicide, as well as good progress in intervening with those who have attempted suicide. Despite these developments, though, considerable challenges remain. In this article, we explore both the recent developments and the challenges ahead for the field of suicide research and prevention. To do so, we consulted 32 experts from 12 countries spanning four continents who had contributed to the *International Handbook of Suicide Prevention* (2nd edition). All contributors nominated, in their view, (i) the top 3 most exciting new developments in suicide research and prevention in recent years, and (ii) the top 3 challenges. We have synthesized their suggestions into new developments and challenges in research and practice, giving due attention to implications for psychosocial interventions. This Perspective article is not a review of the literature, although we did draw from the suicide research literature to obtain evidence to elucidate the responses from the contributors. Key new developments and challenges include: employing novel techniques to improve the prediction of suicidal behavior; testing and applying theoretical models of suicidal behavior; harnessing new technologies to monitor and intervene in suicide risk; expanding suicide prevention activities to low and middle-income countries; moving toward a more refined understanding of sub-groups of people at risk and developing tailored interventions. We also discuss the importance of multidisciplinary working and the challenges of implementing interventions in practice.

Keywords: suicide, theory, challenges, clinical, risk factors, new technologies

INTRODUCTION

Suicide and attempted suicide are major public health concerns. At least 804,000 people take their own lives annually and 25 times that number attempt suicide (WHO, 2014). In recent decades, there have been many welcome developments in understanding and preventing suicide, as well as good progress in intervening with those who have attempted suicide. Despite these developments, though, many challenges remain. In this article, we explore both the recent developments and the challenges ahead for the field of suicide research and prevention. Instead of relying solely on our individual perspectives, we consulted experts in suicide research and prevention from across the globe. To this end, we contacted all of the contributors to the 2nd edition of the *International Handbook of Suicide Prevention* (O'Connor and Pirkis, 2016) and asked them to nominate, in their

view (i) the top 3 most exciting new developments in suicide research and prevention in recent years, and (ii) the top 3 challenges in the field of suicide research and prevention. We were fortunate to receive responses from about one third of the authors representing 12 countries and spanning four continents (see section "Acknowledgments"). We reviewed their nominations, combined them where they described an overarching theme and then classified them into whether they referred to research or practice[1]. We also expanded upon their brief comments and added supporting references (largely in the new developments sections) to elucidate the specific development or challenge. Needless to say, these are fuzzy boundaries and some of the entries could be classified into more than one category. It is important to highlight that this Perspective article is not a review of the literature, although we did draw from the suicide research literature to obtain evidence to elucidate the responses from the contributors. Given the nature of the task, some of the new developments/challenges are very specific and others are more general. The interpretations of the contributors' submissions are ours and do not necessarily reflect those of the individual contributors. It is also important to emphasize that this appraisal of the developments and challenges within the field is not exhaustive and it reflects our biases and those of the contributors; it is our combined view (together with our international experts' views) of the recent past within the field and our thoughts about the future. It could also be argued that, as the contributors all wrote chapters for a single handbook, they are all like-minded individuals with a particular view on suicide prevention. Nonetheless, we believe that this synthesis will be helpful to guide those involved in suicide research and prevention as it highlights hot topics in the field. We also highlight at the outset that despite the developments in understanding suicide risk, our ability to predict suicide remains no better than chance and in many countries across the globe suicide rates continue to increase (O'Connor and Pirkis, 2016; Franklin et al., 2017).

New Developments in Research

The use of new technologies (including social media and naturalistic real-time monitoring via smartphones) to increase understanding of suicidal behavior and to better identify suicide risk were the most frequently cited new research developments nominated by our contributors (see **Panel 1**). With the proliferation of smartphone ownership globally, in low- and middle-income countries (James, 2014) as well as in high-income countries, the growth in interest is not surprising (de Beurs et al., 2015). Given the field's continued inability to predict suicidal behavior with sufficient sensitivity/specificity (O'Connor and Nock, 2014; de Beurs et al., 2015; Franklin et al., 2017), the use of smartphone technologies affords the opportunity to assess risk factors repeatedly, in real-time and in naturalistic settings (de Beurs et al., 2015; Michaels et al., 2015). It is hoped that the use of such technologies will better capture the 'waxing and waning' nature of suicidal ideation (Joiner and Rudd, 2000; Zisook et al., 2009) and account

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[1]Some authors also noted new developments and challenges in policy that are beyond the scope of this article.

for the complex interaction between the risk factors which predict the transition to suicide attempts (de Beurs et al., 2015; O'Connor and Kirtley, 2018). If the promise of new technologies is realized, individuals or clinicians may be able to better identify windows of acute risk in real-time (based, in part, on social media and moment-to-moment monitoring), alert others and hopefully receive interventions to alleviate that risk. Needless to say, there are many practical and ethical barriers that have yet to be overcome, but they are not insurmountable.

The use of ecological momentary assessment (via mobile phones) has already been shown to be feasible (Palmier-Claus et al., 2011; Husky et al., 2014) and it offers considerable promise in enhancing our prediction of the suicidal ideation–suicide attempts gap (Myin-Germeys et al., 2009). In terms of social media, Twitter and Facebook are now being harnessed to help understand the transmission of risk of suicide and self-harm. For example, a recent study from Japan has shown that social media coverage of celebrity suicides varies as a function of characteristics of the celebrity, with large volumes of traffic happening when the celebrity is a relatively young entertainer (Ueda et al., 2017). Also in Asia, text mining and machine learning approaches have been applied to Chinese social media to identify language markers of suicide risk and emotional distress (Cheng et al., 2017). Social media is also being used a lot by young people as a means of communicating distress (Marchant et al., 2017). More generally, although Facebook is rolling out safety protocols that aim to identify social media users at-risk of suicide via their online posts, it is not clear whether such interventions are effective. As such initiatives develop it is vitally important that they are rigorously evaluated and potential unintended consequences (e.g., do they lead to more social isolation as these initiatives lead to a reduction in sharing on social media?) considered. These developments have important implications for theories of suicide risk and contagion as well as suicide prevention efforts more generally. As noted above, although these developments are exciting, best practice guidelines need to be developed to ensure these technologies are implemented safely and ethically (Michaels et al., 2015).

The second most frequently cited development was the growth in theories of suicidal ideation and behavior. This is, perhaps, unsurprising given that at least 12 theories have been put forward since the mid-1980s (O'Connor et al., 2016) beginning with Shneidman's cubic model of suicide (Shneidman, 1985) [obviously Durkheim pre-dates all of these contemporary models (Durkheim, 1897)]. Three of the recent predominant theories (the interpersonal theory, the integrated motivational-volitional model and the three step theory) have received considerable research attention; each fitting within the ideation–to–action framework (Joiner, 2007; Van Orden et al., 2010; O'Connor, 2011; Klonsky and May, 2015; O'Connor et al., 2016; O'Connor and Kirtley, 2018; O'Connor and Portzky, 2018) which describes those theories which posit that the factors associated with suicidal ideation are distinct from those that govern behavioral enaction, i.e., a suicide attempt/suicide (O'Connor and Nock, 2014; Klonsky et al., 2016, 2017).

PANEL 1 | New developments in Research.

1. Use of new technologies and social media (such as a naturalistic real-time monitoring) to increase understanding of suicidal behavior and to identify those at heightened suicide risk.
2. Development of new theories of suicidal behavior which seek to understand specific factors and processes involved in suicidality.
3. The implications of the NIMH's Research Domain Criteria Framework for suicide research.
4. Development of implicit association tasks, given their novelty and implications for theory and potentially treatment development.
5. Big data and machine learning approaches to identify novel risk factors.
6. Development of a novel procedure for examining proximal risk factors for suicidal behavior using retrospective timeline follow back methodologies.
7. The application of network analysis to understanding suicide risk.
8. New developments in brain imaging and epigenetics.
9. Greater appreciation of the interdisciplinary understandings of suicidality including understanding social factors, social disconnection, social roles and social disadvantage.
10. Recognition of the importance of postvention and those with lived experience as key to suicide research and prevention activities.

Although each of these theories emphasizes different factors that lead to the emergence of suicidal ideation and behavior, they have shaped our understanding of the suicidal process: historically, theories of suicide did not explicitly specify the conditions that led to suicidal ideation as being distinct from those associated with a suicide attempt/death by suicide. In brief, these new theoretical developments have been important not only to enhance understanding of the complexities of the suicidal process but they are also forming the basis for the development of psychological interventions to reduce risk of suicide and self-harm. For example, a recent brief psychosocial intervention (a volitional helpsheet) which draws from the integrated motivational–volitional model of suicidal behavior offers promise in reducing risk of repeat self-harm in some individuals following a suicide attempt (Armitage et al., 2016; O'Connor et al., 2017). The recent focus on safety planning and crisis response planning interventions is also consistent with the ideation-to-action framework (Stanley and Brown, 2012; Bryan et al., 2018) and are welcome additions to the field.

Given that suicide and suicide attempts are transdiagnostic phenomena, the move away from a focus on individual mental disorders coupled with the introduction of the National Institute of Mental Health's Research Domain Criteria (RDoC) was identified as a positive development for the field (Glenn C.R. et al., 2017). Indeed, in a novel approach Glenn and colleagues conducted a meta-analysis of transdiagnostic dimensions (Glenn et al., 2018). Rather than focusing on risk factor domains, they viewed the predictors of suicidal behavior through the lens of the RDoC domains. Perhaps unsurprisingly, they found that limited prospective research, to date, fits within the RDoC transdiagnostic framework and even less addresses protective factors. Where there was evidence, it tended to be for the Negative Valence Systems domain (e.g., hopelessness) but there was also growing evidence for suicide theory-related factors (e.g., burdensomeness, defeat/entrapment) (Van Orden et al., 2010; O'Connor, 2011; Glenn et al., 2018). One of the key messages for future research from Glenn and colleagues' recent meta-analysis is that we need to move beyond "the 'usual suspects' of suicide risk factors (e.g., mental disorders, sociodemographics) to understand the processes that combine to lead to this deadly outcome."(Glenn et al., 2018).

The use of innovative study designs and new techniques were also identified as important developments. Four such designs or techniques were highlighted by our contributors. The first is the use of big data and machine learning. Consistent with other areas of psychopathology, the statistical and computing power of big data and machine learning is now being applied to suicide risk assessment. Such approaches have the advantage of being able to combine a large number of risk factors in the prediction of suicide risk and they have already been shown to be moderately successful (Franklin et al., 2017; Hettige et al., 2017; Kessler et al., 2017). As the machine learning field develops, it will be interesting to determine the extent to which the algorithms can be applied to real-world clinical contexts to inform treatment planning (see also Research challenges below).

The second technique is the retrospective timeline followback (TLFB) methodology (Sobell and Sobell, 1992) which systematically assesses behaviors/events in the days/weeks preceding an index event. Although TLFB is not new (Sobell and Sobell, 1992), its application within a case-crossover design to understand suicide risk in the days and hours preceding a suicide attempt is novel. Building on the work of Conner et al. (2012) showing that interpersonal stressful life events may lead to a suicide attempt within the same day, Bagge et al. (2013) conducted a TLFB study but focused on the 48 h preceding a suicide attempt. In the first study of its kind, they demonstrated that negative life events (NLEs) were triggers for a suicide attempt and that NLEs occurred more often on the day of, rather than the day before, a suicide attempt (Bagge et al., 2013). Given that we know relatively little about the factors that trigger suicide attempts in the preceding hours, we would urge others to consider employing the TLFB method.

Third, the innovative work on predicting suicidal behavior using implicit cognitions toward death has been a welcome addition to the literature (Nock et al., 2010). Implicit cognitions assess one's automatic associations with life or death. For example, it may be possible that an individual's unconscious association with wanting to live or die changes as their mood decreases – and this could be incorporated into a real-time warning system. Not only do implicit measures overcome the issue of one's reluctance to disclose suicidal intent but they also tap directly into the automatic processes that govern behavior (alongside reflective processes) (Strack and Deutsch, 2004). Although this is an exciting development, there are many unanswered questions, including, how stable are implicit cognitions, how are they formed, over what time frame and

with whom are they predictive as well as how are they related to existing risk factors? (Dickstein et al., 2015; Hussey et al., 2016; Glenn J.J. et al., 2017). Indeed, a recent study, conducted across two research labs in United States and Scotland, found that implicit attitudes can be activated by low mood in those with a suicidal history (Cha et al., 2018).

Finally, network analysis is a new statistical technique that has been applied to psychopathology in general and suicidal behavior specifically in recent years (de Beurs, 2017; de Beurs et al., 2017; Fried et al., 2017). The advantage of network analysis is that it allows researchers to investigate the complex associations between risk factors or symptoms. It also determines which symptoms are central within a network thereby highlighting specific treatment targets with the potential to be most powerful in reducing risk of suicidal behavior. To our knowledge only one prospective study of suicidal behavior has been published to date (de Beurs et al., 2017) so it is unclear which symptoms will have optimal predictive power. Nonetheless, we urge researchers to embrace this new statistical technique.

The past 20 years of research has also been witness to new developments in brain imaging techniques and epigenetics (van Heeringen, 2014; van Heeringen and Mann, 2014; Sudol and Oquendo, 2016). With respect to the former, in a recent review of 12 neuroimaging techniques, 5 yielded important findings specific to suicide attempts [namely, magnetic resonance imaging (MRI), diffusion tensor imaging (DTI), functional MRI (fMRI), positron emission tomography (PET), and single-photon emission tomography (SPECT)] (Sudol and Oquendo, 2016). Taken together the brain imaging studies have identified both structural and functional abnormalities in the prefronal and limbic areas of the brain in individuals with a suicidal history. Obviously, brain imaging is only part of the answer in piecing together the suicide risk puzzle, but such approaches continue to make an important contribution to our understanding of suicide-specific markers of risk. For example, such research helps to explain, in part, the deficits in emotional regulation and decision-making that often characterize suicide risk (Sudol and Oquendo, 2016).

The neurobiology of suicidal behaviour and epigenetics were also highlighted. There is an established body of research, employing different study designs (including *in vivo*, experimental and post-mortem techniques) finding that impairments in the serotonergic and hypothalamic-pituitary-adrenal axis stress response systems, in particular, are associated with increased vulnerability to suicide (van Heeringen and Mann, 2014; Lutz et al., 2017). The growing recognition of the influence of external factors, including early life adversity, on gene expression, has also led to a step change in our interpretation of the relationship between stress, mental disorders and suicide vulnerability (van Heeringen and Mann, 2014; Lutz et al., 2017). Indeed, there may be unique epigenetic processes (including altered cortisol responses and altered glutamate signaling) at play that increase suicide risk, with Lutz et al. (2017) arguing that understanding the former "has contributed to one of the most meaningful changes to the neuroscience landscape in the past 15 years (Lutz et al., 2017)". There is also evidence that microRNAs may play a critical role in suicide

risk (Serafini et al., 2014). Finally, it is also noteworthy that neurobiological scientists are incorporating key psychological and social factors into their modeling of suicide risk (Turecki and Brent, 2016; Lutz et al., 2017).

No single discipline can address the complex challenge of understanding risk, as suicide is the end product of a complex interplay of neurobiological, psychological, and social processes. Indeed, social factors, including social isolation, disconnection (Stack, 2000; Macrynikola et al., 2018), loneliness (Bennardi et al., 2017) and social disadvantage (Batty et al., 2018) were flagged by a number of respondents as key determinants of suicide risk which have received welcome attention in recent years. What is more, social disconnection and social isolation (O'Connor and Nock, 2014) (including the absence of social support) feature in the interpersonal theory of suicide (Van Orden et al., 2010) the integrated motivational–volitional model of suicidal behavior in particular (O'Connor and Kirtley, 2018) and the 3 step theory (Klonsky and May, 2015).

The social context is crucial to understanding suicide risk especially given the evidence that suicide is socially patterned being significantly more prevalent in areas of social disadvantage compared to more affluent areas (Platt, 2016; Batty et al., 2018). Although there have been some developments in understanding how changes in the social role may contribute to suicide risk, more needs to be done to better understand how conceptualizations of masculinities may elevate suicide vulnerability (Scourfield et al., 2012). Finally, an incredibly positive development in the field in recent decades has been the recognition of the importance of postvention and those with lived experience (including suicide attempt survivors and suicide bereavement survivors) as key to suicide research and prevention activities. Lezine recently described the vital work of suicide prevention through personal experience (Lezine, 2016) which we would urge everyone involved in suicide research to read.

Challenges in Research

The most frequently cited challenge was the issue of the reliability of suicide data due to low base rates and small samples in intervention studies, in particular (see **Panel 2**). This is a significant issue as we endeavor to build the evidence base for what works to prevent suicide. The lack of evidence for the efficacy of psychological and pharmacological treatments to prevent suicide specifically may be, in part, attributable to this issue of scale. As suicide is a low base-rate outcome, almost all clinical RCTs have been underpowered to detect changes in suicide rates and, at best, they have employed suicide attempts as the primary outcome. Even then, the sample sizes have tended to be modest, thereby precluding the a priori investigation of whether interventions may be effective in some groups of participants but not in others. For example, even where there is evidence for clinical efficacy of psychosocial interventions to reduce self-harm (Hawton et al., 2016), we cannot say whether they are effective for men as well as for women. One potential solution might be to include suicide-related measures as secondary outcomes in all psychological treatment trials and then potentially aggregating findings across studies, where appropriate (Holmes et al., 2018). Another solution relates to the

1. Problem with reliability of suicide data due to low base rates and small samples in intervention studies.
2. More investigation of suicide deaths. Recent research has also disproportionately focused on suicide ideation and attempts as outcome variables.
3. Establishment of national and international networks within the research community to enable large-scale evaluation of prevention activities, including multicentre trials.
4. Scarcity of translational research in terms of research evidence informing policy (e.g., means restriction, government austerity measures) and practice (availability of treatments).
5. Need for novel risk factors. Prediction has not been improved since the 1960s, and is restricted by the use of methods that are unlikely to provide clinically useful markers of risk of suicidal behavior.
6. Limited research on short-term/acute risk [most prospective prediction studies are conducted over long periods of time (years), which have limited clinical utility].
7. We need to develop protocols to include high-risk individuals in suicide research as now they are frequently excluded.
8. Interdisciplinary research. Continuing to increase linkages with other disciplines and areas of research and policy (especially interdisciplinary work needed due to new technological developments).
9. More attention needed on social context/social factors in suicide risk including disadvantage and social media. Delivery of more research in low and middle income countries.
10. Concerns about "big data" (e.g., to create real time risk monitoring algorithms does not adequately appreciate the person-specific nature of suicide warning signs).
11. More research/knowledge regarding the transitions from ideation to attempt is required.
12. More research/knowledge regarding factors that differentiate those who make low-lethality attempts versus those who make high-lethality attempts.
13. Understanding the causes of suicidal behavior in persons who do not have mental illnesses.
14. Tensions in research focus: ensure that all areas of research (biology, psychology, epidemiology, and social context) receive appropriate attention.

second challenge. Given that the size of suicide research field is relatively modest and the challenge around statistical power, the establishment of national and international networks may facilitate large-scale research opportunities.

Relatedly, the scarcity of translational research was also noted as a challenge. This is an important consideration, as new developments in suicide research are frequently not translated into saving people's lives. The issue of translation relates to ensuring that research evidence, for example the potential effect of government austerity policies on health, is translated into a change in government policy. Another example would be the limited interest in some countries in implementing strategies in restricting the access to the means of suicide (see also practice challenges). We also need to re-double efforts to increase the likelihood of evidence-based treatments for suicidal behavior being accessible to those who need them. Consistent with the call within the *Lancet Psychiatry* Commission on psychological treatments research (Holmes et al., 2018) to focus on implementation, the same onus is on suicide researchers specifically. The second challenge is also related to the issue of scale, arguably. Excluding large-scale national linkage database type research, the majority of risk factors/predictors research in the field has tended to focus on suicide ideation and attempts as outcome variables – as well as being limited to a small number of predictors. This is an important limitation and perhaps the establishment of the networks or suicide research hubs (as suggested above) can address this dearth in the literature.

As noted earlier in this paper, the field of suicide research has to continue to move beyond traditional risk factors (e.g., psychiatric illness) and to embrace complexity. We need a renewed focus on novel risk factors and multivariable risk factors; this is especially urgent as our ability to predict suicide has not improved since the 1960s and it remains no better than chance (Franklin et al., 2017). With a few exceptions, limited research has focused on short-term acute risk, with researchers often directing their attention to the long-term follow-up of

patients who are high risk (O'Connor et al., 2009; Glenn et al., 2016; Glenn J.J. et al., 2017). Although the latter is important, arguably such studies have limited clinical utility and given that there is increased risk of suicidal behavior in the days and weeks following discharge from hospital (Owens et al., 2002; Chan et al., 2016; Ribeiro et al., 2016), we need to know more about this acute window. In addition, next on the list of challenges relates to the systematic exclusion of high-risk participants from our studies. We need to develop new protocols to include the very people who are most likely to benefit from our research findings. Obviously there are ethical and safety challenges, but, arguably it is unethical to exclude this vital group of participants in research studies.

There have been considerable improvements in terms of interdisciplinary working in recent years. For example, in 2008, one of us (RCOC) organized the European symposium on suicide and suicidal behavior (ESSSB12; the leading suicide research conference in Europe) in Glasgow, Scotland. This was a huge success; it had the theme of 'working together to prevent suicide: research, policy and practice' and there were countless examples of interdisciplinary research showcased therein. What is more, 10 years later, the other one of us (GP) organized the same conference in Ghent, Belgium (ESSSB17), again with the explicit plea for high-quality *multidisciplinary* research. Despite these developments, we should not be complacent; there remains a considerable need to continue building the linkages across disciplines and to involve everyone who has a stake in suicide prevention in our research. Indeed one of our experts highlighted that such working is essential especially to maximize the opportunities afforded by new technological developments. The lack of an international consensus in the terminology used in the field remains a challenge (Silverman, 2016); mutual cross-disciplinary respect is also required to ensure that interdisciplinarity flourishes.

Although Durkheim, one of the pioneers in suicide research, highlighted the central role of social context and social factors in the etiology of suicide in 1897 (Durkheim, 1897), without

question, their roles have not received adequate attention in the 121 years since. This is especially alarming given the scale of the socio-economic gradient in suicide and the established relationships with unemployment and disadvantage (Platt, 2016; Batty et al., 2018). However, the renewed focus on adverse childhood experiences in suicide risk is welcome (Turecki and Brent, 2016; O'Connor et al., 2018). At the other end of the social context spectrum are social media influences and other volitional factors (O'Connor and Kirtley, 2018) which are implicated in suicidal behavior and self-harm. We do not know enough about how such factors act to increase suicide risk in terms facilitating social modeling and increasing cognitive accessibility (O'Connor and Nock, 2014; O'Connor et al., 2014; Mars et al., 2015; Biddle et al., 2016). Another major challenge is the relative dearth of research into suicide in low and middle-income countries (LMIC). Despite the fact that the vast majority of the world's suicides occur in LMIC (WHO, 2014), (although this is changing) there is still insufficient research focus in LMIC.

The advent of machine learning techniques and the use of "big data" algorithms were identified as exciting new developments in the preceding section. However, caution is also urged by our contributors as such algorithms may not adequately appreciate the person-specific nature of suicide warning signs. This highlights the importance of adopting a multi-method approach to understanding suicide risk. As noted above, no single approach, method or discipline has all of the answers; if we are to make further progress in predicting suicide, this is most likely to succeed if we integrate multiple approaches and crucially we should not throw the baby out with the bathwater.

The next three challenges are inter-related as they each refer to a more fine-grained appreciation of sub-types of individuals who are at increased/decreased risk. The first in this triad is also featured in the new developments section, as it calls for a better understanding of the transition from suicidal thoughts to suicide attempts/suicide. As noted above, the ideation to action theories (Van Orden et al., 2010; Klonsky and May, 2015; O'Connor and Kirtley, 2018) are beginning to address this important challenge more systematically, though the findings from the World Mental Health surveys have also contributed to our understanding of these pathways (Nock et al., 2008). Nonetheless, we believe that this is one of the biggest challenges in the field as there are so many gaps in our understanding of this transition (Nock et al., 2008; O'Connor et al., 2012; Dhingra et al., 2015). We also need more research regarding the factors that differentiate between those who make low-lethality attempts versus those who make high-lethality attempts. Although a few high quality studies exist (Rivlin et al., 2013; Marzano et al., 2016; Anestis et al., 2018), focused on specific populations, more in-depth research is required. In addition, although there has been growing focus on the relationship between sleep and suicide risk (Littlewood et al., 2017), among those who have attempted suicide, insomnia may be associated with a more violent method (Pompili et al., 2013).

The final challenge in this group calls for increased understanding of the causes of suicidal behavior in people who do not have psychiatric illnesses. Despite the evidence that most people in Western countries who die by suicide have a diagnosed mental illness (Cavanagh et al., 2003), there

are cultural variations (Phillips, 2010) and some argue that the association between mental illness and suicide is not as marked as is commonly reported (Hjelmeland and Knizek, 2017). As the relationship between mental illness and suicide is often ascertained via a psychological autopsy, researchers should implement the recommendations on the next generation of psychological autopsy studies that aim to increase the accuracy of data collected (Conner et al., 2011). These latter three challenges highlight the more general point that we still often treat people at risk of suicide as an homogeneous group but we need to move beyond such characterization and identify distinct profiles of people at risk: the precision medicine approach.

As the determinants of suicide are many, spanning neurobiology, psychology and social factors, it is not surprising that there is a tension between where our research effort should be focused. A number of contributors argued for an increase in attention to the neurobiological determinants of suicide as these would inform treatment targets and a reduced focus on epidemiology. As noted above, no one discipline has all of the answers so it is important that all areas receive attention.

New Developments in Practice

The most frequently reported new development in research (i.e., the use of new technologies) is also the most frequently mentioned new development in practice (see **Panel 3**). So called 'new' technologies such as the internet and mobile phones not only increase our understanding of suicidal behavior but they can also be harnessed for treating and connecting with individuals who are suicidal (Hom et al., 2015; de Beurs et al., 2015; Hetrick et al., 2017; Nuij et al., 2018).

Given that less than one third of suicidal individuals seek help or make use of mental health services it is clear that there are numerous barriers to traditional forms of treatment such as stigma and shame, low perceived need, a preference for self-management, availability and high cost of care (Bruffaerts et al., 2011; Andrade et al., 2014). Online interventions are well placed, therefore, to overcome many of these barriers as they are easily accessible anywhere at anytime, at low cost, and are mostly anonymous or highly confidential (Hom et al., 2015).

Although there have been several studies sharing positive effects of online interventions in the reduction of suicidal ideation (Christensen et al., 2013; Saulsberry et al., 2013; Williams and Andrews, 2013; Mewton and Andrews, 2015) many of these online interventions were developed to manage depression and were not designed to target suicidal ideation specifically. In a rare exception, van Spijker et al. (2014) examined the effectiveness of an online intervention specifically targeting suicidal ideation in a Dutch community sample. The results were promising, showing a significant reduction in suicidal ideation thereby highlighting the potential for managing suicidal ideation via an online intervention. However, in this study individuals with severe suicidal ideation were excluded and a controlled follow-up period was missing. This online intervention has also been examined in an Australian community sample by use of a randomized controlled trial (van Spijker et al., 2018). Although the intention-to-treat analyses showed significant reductions in the severity of suicidal thinking at post-intervention, 6 and

1. The use of new technologies, the internet and mobile phones for the treatment of (and connecting with) suicidal patients, vulnerable young people, older adults at risk and those who are not in contact with clinical services.
2. A growth in suicide prevention interventions including psychosocial interventions to reduce suicidal behavior that have been evaluated in RCTs and thus having demonstrated efficacy.
3. The growth of clinical trials on suicide-specific interventions, almost all of which acknowledge that suicide must be the focus of treatment rather than viewing it as a symptom of some other mental disorder.
4. The identification of very high-risk groups that could benefit specific interventions.
5. Greater involvement of and attention to the insights of those with lived experience of suicide in the design and improvement of interventions and services for suicide prevention.
6. Growing evidence on effectiveness of school-based programs.
7. New anti-psychotic drug treatments.

12 months, no overall group differences were found. It is, thus, clear that more research is needed and it is encouraging that this online intervention is currently being examined in other countries such as Denmark and Belgium (De Jaegere, submitted).

Although it is not surprising that suicide experts have focused on suicide-specific tailored interventions, it is important to direct attention at suicidal thoughts and behavior as treatment targets rather than viewing them exclusively as symptoms or epiphenomena of mental disorder. Indeed, many previous studies have focused on the treatment of depression and viewed suicidal ideation as a secondary outcome that may improve if the intervention for depression is effective. Therefore, the growth in clinical trials that have investigated the efficacy of suicide-specific prevention and intervention strategies aimed at reducing suicidal behavior is a welcome development.

To this end, there has been growing evidence for suicide-specific *psychosocial* interventions which show promise in reducing suicidal behavior (Hawton et al., 2016). For example, Gysin-Maillart et al.'s (2016) 24-month follow up randomized clinical trial (the Attempted Suicide Short Intervention Program; ASSIP) of a novel brief therapy for patients who had attempted suicide was effective in reducing suicidal behavior in a real-world clinical setting. ASSIP was associated with a circa 80% reduced risk of repetition of at least one suicide attempt and ASSIP participants spent 72% fewer days in the hospital during follow-up compared to controls. ASSIP consists of three therapy sessions followed by regular contact through personalized letters over 24 months (Tarrier et al., 2008). The development of the Collaborative Assessment and Management of Suicidality (CAMS) approach has been an exciting new development in the field which also offers considerable promise (Comtois et al., 2011; Jobes, 2016).

Another brief psychological intervention with a volitional helpsheet (VHS) has also yielded promising results (O'Connor et al., 2017). Although the VHS had no overall effect, *post hoc* analyses suggested that this brief adjunct intervention might be effective in reducing the number of self-harm repetitions following a suicide attempt among those with a self-harm history. In another modest sized RCT which compared a 6-week telephone-based positive psychology (PP) intervention with a cognition-focused (CF) control intervention, those who received the CF intervention reported greater improvements in hopelessness at 6 weeks but not at 12 weeks (Celano et al., 2017). This study recruited patients who had recently been hospitalized

for depression and suicidal ideation or behavior. There was also greater improvement in suicidal ideation, depression and optimism at 6 and 12 weeks after receipt of the CF intervention. Contrary to the authors' hypothesis, however, it was the CF intervention that was superior in improving hopelessness, other suicide risk factors and positive psychological constructs rather than the PP intervention (Celano et al., 2017).

These latter studies add to the established evidence that CBT has a significant effect in reducing suicidal behavior (O'Connor and Nock, 2014; Hawton et al., 2016). However, a systematic review and meta-analysis from 10 years ago still nicely summarizes the gaps in our knowledge (Tarrier et al., 2008). Tarrier et al.'s (2008) subgroup analyses confirmed significant treatment effects for CBT in adult samples (but not in adolescent samples), for individual treatment delivery (but not for group administration) and for CBT when compared to minimal treatment or treatment as usual (but not when compared to another active treatment; Tarrier et al., 2008).

As noted in the new research developments section, the insights offered by those with lived experience into the design and improvement of suicide prevention programs were also highlighted by our experts. Although their contributions have taken different forms, there is now a considerable body of qualitative evidence on the aftermath of a suicidal crisis or attempt based on interviews with those with lived experience. Such studies have deepened our understanding of what it is like to be suicidal and how to help those who are vulnerable (Lin et al., 2009; Oliffe et al., 2012; Vatne and Naden, 2016).

More recently, attention has been paid to ensuring that such insights and testimonials inform the development and implementation of suicide prevention programs. For example, Jones et al. (2018) explored the views of health and human service workers with regard to the development of a suicide prevention training program. This included meaningful involvement of someone with lived experience in the development and delivery of the training. The authors concluded that the inclusion of a person with lived experience of suicidality resonated strongly with the participants and provided a powerful learning experience for those involved. A strong positive element was that the person with lived experience gave participants crucial insights into how to have conversations around suicide and how best to ask the questions about thoughts of suicide directly. Although this study indicates the positive effect of including people with lived experience the authors also caution that the

inclusion of a person with lived experience must be appropriate and safe. In addition, despite the progress in involving people with lived experience to improve research and practice, we should not be complacent; we have a long way to go in terms of maximizing their involvement to the mutual benefit of all.

The growth in specific interventions for high-risk groups was also highlighted as an important new development. By way of an example, Vijayakumar et al. (2017) reported the effectiveness of CASP, an intervention by community volunteers among refugees, to reduce suicidal behavior. This intervention involves contact between community volunteers and refugees and the use of safety planning cards. The findings from the RCT were positive as the intervention was associated with a significant reduction in suicidal behavior among the refugees. Interventions for another high-risk group, older adults, are also encouraging. Specifically, a recent systematic review of interventions to prevent and reduce suicidal behavior in older people showed that several interventions are effective, with at least some evidence for multi-faceted primary care-based depression screening and management programs, pharmacotherapy and psychotherapy, and telephone counseling (Okolie et al., 2017). In short, there is the increasing recognition that the one size fits all approach to suicide prevention initiatives is not effective and we must tailor interventions to fit specific at-risk populations.

The growing evidence for effective school-based programs was also highlighted by our experts. There is now some evidence for peer-support prevention programs and skills-based training programs, which show positive outcomes regarding coping skills and referral to help (Katz et al., 2013; Hetrick et al., 2014, 2017). There is also some evidence that screening programs have some utility in identifying young people at risk (Robinson et al., 2013). Although it is important to note that there are many challenges with screening programs including the issue of false positives and the need for available resources to support those who are identified as high risk. School-based awareness programs have also been shown to significantly improve knowledge, attitudes and help-seeking behavior (Cusimano and Sameem, 2011). However, the most promising findings are those from the Saving and Empowering Young Lives in Europe (SEYLE) study (Wasserman et al., 2015). In this multicentre cluster-randomized controlled trial, adolescents who received the youth aware of mental health (YAM) program reported a significant reduction in incident suicide attempts and severe suicidal ideation compared with the control group at 12-month follow-up. As with all areas of practice, it is important to replicate these findings.

New anti-psychotic drug treatments were identified as a final new development. Although there is "at least modest evidence suggesting that antipsychotic medications protect against suicidal risk" (Kasckow et al., 2011), a combination of psychosocial and pharmacological management is recommended. Of all the anti-psychotic medications, though, the best evidence is for clozapine (Kasckow et al., 2011). Consistent with the pharmacological treatment literature more generally, there remains a dearth of large-scale treatments of anti-psychotic medications.

Challenges in Practice

The experts' opinions regarding the challenges in practice were diverse, with the majority of the suggestions only being mentioned by one expert (see **Panel 4**).

The only challenge which was mentioned multiple times was the need for more research and evidence for universal and selective prevention strategies. This is, perhaps, unsurprising as the USI (Universal, Selective, Indicated) prevention model forms the basis for much suicide prevention activity worldwide. Despite its use as an overarching framework, it is obvious from the research literature that there are extensive gaps in our knowledge about what works to prevent suicide and how the different levels of intervention (USI) interact. However, there have been recent efforts to investigate the synergies between the different components of suicide prevention strategies (Harris et al., 2016). Given that suicide rates continue to rise in some countries (e.g., in the United States), perhaps it is time to reconsider whether a paradigm shift, rather than a 'more of the same' approach to suicide prevention is required.

As highlighted above, there has been welcome attention on indicated prevention strategies, focusing on those who are already suicidal. However, new thinking about universal and selective prevention is urgently required so that we can promote populations to be more resilient, to increase their coping skills and protect them from suicide risk. It is a major problem for those involved in suicide prevention including policy makers that there is so little evidence for universal and selective prevention strategies. Indeed, one of the few evidence-based strategies within universal prevention is the implementation of universal school awareness programs (Zalsman et al., 2016); much more research is urgently required.

More broadly, we also need to challenge attitudes, beliefs and knowledge regarding the preventability of suicide. Although suicide prevention is very difficult in practice, it is not impossible; but the existence of negative attitudes and beliefs that suicide is inevitable, that it cannot be prevented, are unhelpful. The establishment of the Zero Suicide (https://zerosuicide.sprc.org) movement has been very important in this regard, promoting the message that every suicide is one death too many. Related to the latter are the attitudes toward means restriction, especially in the context of restricting access to guns in the United States. Although restricting access to the means of suicide is one of the most effective suicide prevention strategies (Zalsman et al., 2016) in practice it is challenging to convince policy makers, gatekeepers, or mental health professionals of the need to implement a means restriction strategy. It is hoped that the recent focus on means safety (Anestis et al., 2018) rather than means restriction *per se* may help in this regard. The major challenge of integrating conversations about lethal means safety into standard primary care, mental health and substance use clinics was also identified by one of our experts.

There is also a lack of evidence regarding the most effective ways of implementing suicide prevention methods and strategies in different institutions/organizations including hospitals, mental health institutions, local governments and schools. However, there is evidence from the UK that implementing mental health

PANEL 4 | Challenges in Practice.

1. More research and robust evidence are needed for universal and selective prevention strategies.
2. Need to change attitudes, beliefs and knowledge regarding the preventability of suicide in general and the utility of means restriction and means safety in particular.
3. Ensuring that those in contact with health and social care services receive high a quality chain of care. The development of better linkages between crisis intervention, statutory services, therapists and the wide range of community and voluntary sector organizations involved in suicide prevention is vital.
4. A need for more evidence to inform and guide best practice for the evaluation, treatment, and follow-up of people who present to hospitals with self-harm.
5. Better knowledge about how to help men at risk of suicide, particularly how to motivate prevention efforts and treatment engagement.
6. Identify and treat first onset suicidal ideation in adolescents.
7. Learn from other areas of public health including studying the effects of a dental health approach to improve mental health and prevent suicide.
8. Much more attention to the lived experience of people in the development of interventions and service design.
9. Very little suicide-specific treatment is available in the real world. There is a need to improve training and dissemination of evidence-based approaches.
10. Integration of clinical knowledge into the evidence base.

service recommendations in particular the provision of 24 hour crisis care, having local policies for dual diagnosis and conducting a multidisciplinary review after a suicide are associated with falling suicide rates (While et al., 2012). Indeed, a major challenge is the reality that at least one quarter of people who die by suicide have had previous contact with mental health services (NCISH, 2017). We await with considerable interest the findings from on-going evaluations of the implementation of Zero Suicide (Mokkenstorm et al., 2017) initiatives as they will provide valuable insights into the challenges and facilitators of rolling out multi-level suicide prevention interventions in health care settings.

The chain of care and the need for continuity and high quality care are key to successful suicide prevention efforts especially among those who present to clinical services following self-harm. Indeed, in many countries throughout the world there are recommended standards of care and aftercare, but the reality is that these standards are frequently not implemented. Mehlum and Mork describe these challenges but crucially they have also identified key solutions which should improve adherence and sustainability over time (Mehlum and Mork, 2016). There is also considerable need for better linkages between crisis intervention, statutory services, therapists and the myriad of community and voluntary sector organizations that work in suicide prevention. Although it is difficult to set up studies to evaluate optimal chains of care, we urgently need more evidence about how to organize and implement linkages between different services and mental health settings.

There have been several studies regarding the clinical management of patients who present to hospital following suicidal behavior, nonetheless there is still a need for more evidence to inform best practice for the evaluation, treatment and follow-up of these patients. Although it is recommended that all patients who attempt suicide or self-harm should receive a comprehensive psychosocial assessment, at the hospital level there are wide variations in the clinical management such that the proportion of clinical presentations receiving psychosocial assessment (range 22–88%), medical (22–85%) or psychiatric (0–21%) admission and referral to non-statutory services (4–62%) (Cooper et al., 2013) varies markedly. However, there seems to be little association between these differences in hospital management and the repetition rate of self-harm (Cooper et al., 2015). As this is surprising, future studies should focus more on understanding the processes underlying the different management and treatment styles of suicidal people at hospital level and their relationship to patient outcomes.

As mentioned in the new developments in practice section the increased involvement of people with lived experience can only be positive for the field. Moreover, there is the possibility that including people with lived experience of suicidal ideation and/or behavior in suicide prevention programs might have other positive effects by providing a more powerful learning experience. Their involvement may yield similar effects to the Papageno effect that has been shown in relation to the media portrayal of suicide. The Papageno effect describes the positive and preventive effects of using positive testimonials of people with lived experience who have survived a suicide attempt and who have learned to overcome a suicidal crisis in a media portrayal of suicide. See Pirkis et al. (2016) for an overview of media influences and suicidal behavior literature.

Whereas the positive effect of including positive testimonials of people with lived experience in media portrayal is well established (Niederkrotenthaler et al., 2009, 2010) it ought to be extended to other areas of suicide prevention. Although there are some studies reporting the involvement of people with lived experience in the field of mental health these studies have tended not to evaluate this approach (Repper and Breeze, 2007). The Jones et al. (2018) study noted in the new developments in practice section is one of the few studies to explore the benefits of involving people with lived experience of suicidality in such studies. There is a strong need, therefore, for more evaluation studies investigating the effects, opportunities, and risks of involving people with lived experience in suicide prevention programs.

Given that male deaths by suicide vastly outnumber female suicides (Turecki and Brent, 2016), there is a huge challenge to gain more knowledge regarding how to approach and more effectively reach men with suicide prevention strategies. Men seek less help and communicate less about mental health problems so the challenge is how to motivate them for prevention and treatment. We also need to be careful that we do not blame men for not seeking help especially given that the support and services may not have been designed with them in mind. The stigma regarding mental health problems is also higher for men than for women, therefore, it is important that public health campaigns should direct their focus on men, specifically. As noted earlier, the extent to which existing interventions to reduce risk of suicide are effective for men is largely unknown.

Another challenge identified by our experts was the need to focus more on suicide risk in adolescents. In particular we need to identify and treat first onset suicidal ideation in adolescents. Indeed, if we are to better identify adolescents early on in the suicidal process we need to learn more about how to help them manage their suicidal ideation, how to enhance their coping skills, their social skills and capacity to solve social problems. We need to develop evidence-based interventions to increase their resilience that could help to buffer against suicide risk early in life. Targeting suicidal ideation in early adolescence should thus be a specific focus for suicide prevention efforts. As noted above, school-based suicide prevention programs should be considered in this regard (Katz et al., 2013; Robinson et al., 2013).

As a discipline, we should remain open to learning from other areas of public health and applying any such lessons to suicide prevention. For example, a very novel but intriguing suggestion by one of our experts is to study the effects of a dental health approach to determine whether it could be effective in improving mental health and prevent suicide. Translating the dental health approach into a mental health approach could involve us engaging in mental health self-care for a few minutes, say twice a day and this could be supplemented by an annual or 6 months check-up by a health care professional. Needless to say, a key challenge for such an approach would be around how we change existing attitudes, beliefs and knowledge regarding mental health to ensure that mental health self-care becomes an obvious and vital part of our daily health care, just like dental health care is. We should also look at what has been done with respect to stroke, heart disease and cancer; all areas of public health where the death rates have decreased markedly in recent decades while suicide rates have remained stable or increased.

Another fundamental methodological challenge for both practice and research is how to increase the integration of clinical knowledge into the clinical evidence-base. Indeed, well designed empirical studies and theoretical models to understand suicidal behavior often lack clinical knowledge; their translatability and implementation would benefit markedly from such knowledge. The complexity of the suicidal process and the individual differences associated with the development of suicidal ideation and behavior that are often observed in clinical practice are frequently overlooked in research, thereby limiting their clinical utility. A related issue is that there are few suicide-specific treatments that are actually available in the real world. It is incumbent on health care managers and policy makers to prioritize the accessibility of evidence-based treatments to those *who* need them *when* they need them. In short, the clinical management of patients who are suicidal remains a huge challenge, both in terms of the evidence base for tailored interventions and the accessibility of such interventions for those who are most vulnerable.

CONCLUSION

It is an exciting time to be working in suicide research and prevention. In many countries throughout the world there have been important developments in understanding and preventing suicide. The four panels highlight key opportunities, challenges and pointers to move the field forward. We hope that their contents will guide the future research agenda, acting as a catalyst for new thinking in suicide prevention research and practice. However, it is important to reiterate the limitations of this Perspective article. Although the new developments and challenges outlined herein are extensive, they are not exhaustive but represent the views of 32 researchers or practitioners in the field. Nonetheless, the new developments identified by our experts are exciting, harnessing new technologies and approaches to better understand who is most at risk of suicide and why. However, many challenges remain; first, our ability to predict suicide is still not much better than chance and although there has been a welcome focus on suicide prevention interventions (both at the public health and clinical level), many gaps in our knowledge remain. None of us has all of the answers, and we hope that the suggestions reported herein will encourage new synergies and opportunities for interdisciplinary research. Finally, we are optimistic that the new developments and the field's determination to overcome the identified challenges will combine to save more lives across the globe.

CONSENT AND ETHICAL APPROVAL

All contributors named in the section "Acknowledgments" were asked for their views on new developments and challenges in suicide research and prevention. They all provided written informed consent (by email) that their views could be collated by the authors for use in publication. Consistent with the University of Glasgow's Medical, Veterinary and Life Sciences ethics committee's institutional policy, no ethical approval was sought as contributors were giving their views in their expert capacities. It is important to note, however, that the views and interpretations expressed in the article are those of the authors and not the contributors.

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Strategies to Deal With Suicide and Non-suicidal Self-Injury in Borderline Personality Disorder, the Case of DBT

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One of the most problematic aspects of borderline personality disorder resides in repeated non-suicidal self-injury (NSSI) and suicide attempts. These behaviors constitute the prime therapeutic target and a factor that complicates patient care, namely in terms of therapeutic continuity. It has been demonstrated that Dialectical Behavior Therapy (DBT) is efficient in reducing the symptomatology of this disorder, as well as NSSI and suicide. DBT is a multi-component psychotherapeutic treatment, and the effectiveness of its individual constituents is therefore a relevant question. Studies comparing its various components (individual therapy, group therapy, and standard DBT) have not revealed any marked difference between them, other than a tendency toward improved patient retention rates in the standard version of the treatment. The aim of this study is to review the various components of DBT and their constituent parts, in order to highlight the importance of focusing on self-harm behaviors within the therapy as a whole. Although therapeutic strategies may differ and target directly suicide or NSSI, managing the quality of life, and the persistence of the therapeutic alliance (and of the interpersonal alliance) is equally important in terms of treatment efficacy.

Keywords: borderline personality disorder, suicide attempts, dialectical behavioral therapy, self-harm, psychotherapy

INTRODUCTION

Borderline Personality Disorder (BPD) is a disorder affecting from 1 to 6% of the population (Torgersen et al., 2001; Gross et al., 2002; Lenzenweger et al., 2007). Despite a relatively favorable spontaneous evolution, with 80% of patients no longer meeting the DSM diagnostic criteria after a 10-year period, it nonetheless gives rise to significant suffering and functional limitations (Skodol et al., 2002; Zanarini et al., 2006; Niesten et al., 2016). The associated suicide rate is tragically high and estimated at 8–10% (Oldham, 2006). Over the course of the past two decades, various therapies specifically adapted to this disorder have been developed and include Dialectical Behavior Therapy (DBT), Mentalization-Based Treatment (MBT), Transference Focused Psychotherapy (TFP) and Good Psychiatric Management (GPM) (Linehan et al., 1991; Clarkin et al., 2001; Bateman and Fonagy, 2010; Links et al., 2015). Each treatment relies on a consistent theoretical model and provides psychotherapeutic interventions that target the disorder's central dimensions, which include a perturbed sense of identity, intense and unstable interpersonal relations, emotional

dysregulation, poor impulse control and suicidal, and self-harm behaviors (Lieb et al., 2004; Leichsenring et al., 2011).

NON-SUICIDAL SELF-INJURY AND SUICIDE

Non-suicidal self-injury (NSSI) and suicide are the treatment's primary targets. They are associated with a high rate of emergency care, hospital treatment and outpatient treatment (Crowell et al., 2009). In the past, self-harm was viewed as suicide equivalent, but clinicians have gradually started drawing purpose-based differences between these behaviors in order to provide specific therapeutic responses (Linehan et al., 1991).

Between 17 and 80% of BPD patients are prone to repeated NSSI (the most frequent being self-injury by cutting or burning), and for the same population, suicide attempts range from 46 to 92% (Zanarini et al., 2008). NSSI has a higher prevalence among adolescents and young adults, and is associated with an array of psychosocial issues and is believed to be a transdiagnostic manifestation arising from an underlying vulnerability inherent to the psychopathology (Crowell et al., 2009; Selby et al., 2015). NSSI differs from suicide in that it is not associated with suicidal inclinations: furthermore, the strategies implemented for behaviors aiming at regulating negative emotions are different from those used to manage behaviors aiming at causing death (Crowell and Kaufman, 2016). Unlike suicide, NSSI has an immediate and short-term impact, and must be carried out repeatedly to produce the desired outcome (Shaffer and Jacobson, 2009). Furthermore, patients who are disposed to NSSI generally resort to other methods when attempting suicide, a fact that suggests that suicide is not a severe manifestation of NSSI, and that NSSI does not amount to failed suicide (Stanley et al., 2001). However, NSSI and suicide are bound by a complex relationship, and it is often difficult to draw a clear distinction between both categories. Therefore, individuals do not always fit into one category or the other. In addition, some patients whose intention to die is moderate use highly lethal means, and inversely individuals who report highly intense suicidal urges use non-lethal means (Crowell and Kaufman, 2016). The presence of NSSI is the strongest predictor of future suicide attempts. Indeed, a study has shown that 70% of adolescents with NSSI report a suicide attempt in the course of their life (Nock et al., 2006). This tragic relationship is supported by further evidence, since 1.8% of patients presenting NSSI commit suicide within 1 year following the incident (Owens et al., 2002), and up to 8.5% commit suicide within a 22-year period (Jenkins et al., 2002). Finally, it appears that NSSI has some protective value, as long as it provides relief from mental suffering during dissociative episodes (as a coping strategy) (Kliem et al., 2010).

Several theoretical elaborations have examined the passage from suicidal ideation to suicide. These "ideation to action theories," such as the interpersonal theory of suicide (IPTS) by Joiner, and the three-step theory (3ST) by Klonsky, highlight the role of pain, of hopelessness and of perceived interpersonal disconnection in the emergence of suicidal ideation. People who commit suicide differ from those who merely entertain suicidal thoughts by their capability for suicide. In particular, this capability is acquired through traumatic life experiences and NSSI (Klonsky et al., 2018).

Studies reveal that the efficacy of therapeutic interventions is improved when NSSI and suicide are considered globally and that the effect of therapies seems stronger on NSSI (Ougrin et al., 2015).

Dialectical behavior therapy has been shown to have a statistically significant effect on the reduction of personality disorder symptoms (Kliem et al., 2010; Cristea et al., 2017). For NSSI, a number needed to treat of 14 to prevent 1 incident is better than in other medical intervention (Ougrin et al., 2015). Patients receiving psychotherapeutic treatment are less likely to attempt suicide than patients receiving treatment as usual, in particular for those who suffer from BPD (Calati and Courtet, 2016).

DIALECTICAL BEHAVIORAL THERAPY AND SUICIDE

Dialectical behavior therapy is a structured cognitive-behavioral treatment initially designed to treat chronically suicidal patients suffering from BPD. It is based on a biosocial theory of emotion dysregulation. Simply put, BPD's pervasive emotion dysregulation is a consequence of repeated transactions during child development between biological vulnerabilities and an invalidating environment. The term "dialectical" refers to a philosophy defining the nature of reality, and to persuasive dialog and relationship. Dialectics are at the heart of the therapy, from the very conceptualization of emotional dysregulation to the implementation of DBT core strategies. For instance, the balance between acceptance and change is crucial in DBT. Core strategies include change-oriented interventions like contingency management or cognitive restructuring and acceptance-orientated interventions including the practice of mindfulness. These skills are implemented in a constant effort to strike a dialectical balance between accepting the reality as it is, and changing behaviors that need to be changed. The four treatment modes of standard DBT described herein are as follows: individual therapy, group skills training, telephone coaching, and the therapist consultation team. Each plays a role in the therapy's main functions (Linehan et al., 1991, 2015), which are: (1) Improving the patient's skills, (2) Extending these skills to the environment, (3) Increasing and maintaining the patient's motivation to change, (4) Increasing the therapist's motivation and skills, and (5) Structuring the environment to optimize the implementation of the treatment.

Although treating NSSI is a priority in the hierarchy of therapeutic targets, it is not explicitly mentioned as one of the therapy's main functions. It is theorized that these behaviors are reduced or eliminated as a result of a range of factors, such as the acquisition of skills in various areas, and the acceptance of life's difficulties. In DBT, NSSI and suicidal behaviors are viewed as responses to unbearable emotional suffering, and though they may be dysfunctional, they are highly effective emotion regulation strategies. Indeed, they dramatically reduce

emotion intensity and immediately relieve from intense suffering. Besides, they can generate social consequences, such as obtaining more presence and help from the environment, or justifying a hospital admission. DBT aims to change dysfunctional patterns in emotion regulation, impulse control, identity and interpersonal relationships to construct a life worth living. Emotionally dysregulated patients are encouraged to change their maladaptive problem-solving strategies by learning skills to tolerate distress with more effective and adaptive means. Four skills modules are proposed: mindfulness, distress tolerance, interpersonal effectiveness and emotion regulation.

Dialectical behavior therapy has been shown to be effective in terms of its therapeutic objectives: reducing NSSI and suicide, reducing therapy-interfering behaviors as well as behaviors interfering with the quality of life (Linehan et al., 1991, 2006; Bohus et al., 2004; Burmeister et al., 2014).

The fact that DBT relies on four treatment modes naturally gives rise to the question of the relative effectiveness of each component. The usefulness of individual and group therapy has been tested separately, without revealing any significant difference in terms of suicide attempts, NSSI occurrence, and the number of hospitalizations or emergency consultations. The superiority of the standard treatment appears to reside in increased patient retention rates – which is a feature of interest given that high dropout rates are one of the greater problems among this group of patients - but also in globally improved mental health (Linehan et al., 2015).

However, identifying the key factors driving the efficacy of DBT remains delicate, in particular as far as NSSI or suicide and change mechanisms are concerned (Calati and Courtet, 2016).

INDIVIDUAL THERAPY

Two important factors should be noted: The quality of the therapeutic alliance in DBT, and compliance with the target hierarchy in individual therapy.

In Dialectical behavior therapy, it is essential to establish a therapeutic alliance that combines warmth and structure (Robins and Koons, 2000). For patients, this is often the first positive experience of therapy. The demeanor, attitude and words of the therapist should be considered as therapeutic in themselves, as they encourage the creation of a relationship stemming from understanding, validation and trust, which in turn increases motivation and promotes therapeutic change. From the therapist's point of view, considering the BPD in a non-judgemental and empathic way is conducive to collaboration, despite difficult behaviors that can push the therapist to his or her limits. This kind of relationship helps increase patient retention rates (Linehan et al., 2015).

In a study pertaining to therapeutic alliances and introjection comparing DBT and community treatment by experts (Bedics et al., 2012), patients reported major improvements in terms of self-affirmation, self-love, self-protection, as well as fewer instances of self-attack, during the course of treatment and the 1-year follow-up period. The quality of the therapeutic

alliance combines with the treatment itself to yield positive results. Patients undergoing DBT who perceived their therapist as self-assured and protective reported fewer cases of NSSI.

NSSI AS PRIMARY TARGET

Dialectical behavior therapy individual therapists are responsible for the management of suicidal crises. For example, the therapist faced with a suicidal patient can refer to specific DBT strategies including the therapist survival protocol, which defines what to do when the patient is in crisis. The therapist has the responsibility to provide a clear and active response to prevent the patient from committing NSSI or suicide, for example by removing lethal means available to the patient. Mean restriction is a way to reduce the capacity to attempt suicide while teaching the patient to survive the crisis by tolerating acute distress using skills with the support of the therapist.

The structure of individual therapy also helps the therapist to target, directly and overtly, any change in the pattern of ideas and of speech, and any evolution of suicidal behaviors. The individual therapy schedule in DBT is set according to the hierarchy of targets established when the patient and therapist enter into a therapeutic alliance. It relates to specific behaviors that need to be reduced: (1) Life-threatening behaviors, (2) non-collaboration and non-participation behaviors or behaviors that threaten to interfere with the therapy or push the therapist to his/her limits, and (3) behaviors that interfere with the quality of life. Any recent NSSI is thereby systematically addressed as a priority by conducting a behavioral chain analysis. The aim of a chain analysis is to describe the chain of components leading to a specific behavior and to establish a plan for problem solving. It helps to understand what prompts and what maintains the behavior and to figure out what problems must be solved and which skills are missing to stop the behavior. The chain analysis provides information on what motivates NSSI or suicide and allows therapist and patient to figure out how to prevent these behaviors. Motivations for suicide are frequently related to acute emotional distress and hopelessness (internal motivations) or to a need to communicate and influence others (external motivations); internal motivations appear to be more strongly correlated to a desire to die and to a higher level of intent and preparation (Klonsky et al., 2016). The individual therapist has to focus on the patient's specific motivations for NSSI or suicide and reasons for living, and help him/her apply the needed skills to build a life worth living and reduce internal and external motivations for suicide.

SKILLS TRAINING GROUPS

The goal of skills training is to teach the patient the general skills to help him/her solve problems in living. Skills training is probably a key element of DBT as it directly addresses behavioral,

cognitive, emotional, and interpersonal dysfunctional patterns which lead to NSSI and suicide. There are two acceptance skills modules (mindfulness and distress tolerance) and two change skills modules (emotion regulation and interpersonal effectiveness) that are balanced to address one of the major dialectics for the patient: to accept himself/herself and reality as it is, and to change what needs to be changed. Mindfulness skills teach to focus attention on the present moment and to observe reality as it is. It addresses patient's dysregulation of the sense of self and reduces the feeling of being disconnected from others. Distress tolerance skills address the ability to tolerate and survive crisis situations and to accept painful events or emotions, in order to reduce suffering. These skills are essential to avoid NSSI which are often related to overwhelming suffering. Interpersonal effectiveness skills help maintain and improve relationships, deal with conflict situations and obtain what the person needs while maintaining self-respect. These skills are necessary to solve interpersonal conflicts without having to rely on extreme and dysfunctional behaviors such as threats or verbal aggression. The goals of emotion regulation skills are to improve emotion observation and understanding and to reduce emotional vulnerability. The skills acquisition allows patients to achieve better emotional and behavioral control, which translates primarily into reduced NSSI and suicide (Neacsiu et al., 2010). Moreover, two studies showed that DBT with skills training is more efficient in reducing NSSI than DBT without skills training (Linehan et al., 2015; Euler et al., 2018).

Furthermore, by sharing personal experiences with others (during groups), bonds can be created, with the probable outcome of increasing the feeling of interconnectedness, in a context of reinforcement and non-judgement.

TELEPHONE COACHING

In Dialectical behavior therapy, phone calls are encouraged for many reasons (Linehan, 1993). Firstly, BPD patients often have difficulties in asking for help and will rely on extreme behaviors, such as NSSI and suicide, to ask for help or to increase presence and support from the environment. Secondly, patients need help to implement and generalize skills acquired during group sessions into everyday life. The patient is encouraged to call before engaging in NSSI so that he or she may receive coaching and be reminded to use his or her skills. Telephone coaching is an essential prevention means as it focuses on NSSI and suicidal risk assessment and the use of alternative solutions to solve the problem. Phone calls are also an effective way of healing the therapeutic alliance and improving patient satisfaction and reducing the risk of therapy dropout (Chalker et al., 2015). It seems obvious that the availability of the therapist outside scheduled individual sessions helps develop a sense of security and connectedness for the patient, and probably for the therapist too. A study (Coyle et al., 2018) shows that visits to crisis centers were linked to suicide risks. DBT, with its telephone coaching mode and skills training, namely in terms of distress tolerance strategies, helps reduce dependence on these

services, indirectly lowering the risk of suicide (Stanley et al., 2001).

CONSULTATION TEAM

Dialectical behavior therapy assumes that an effective therapy should pay as much attention to the therapist as it does to the patient; that is why the consultation team is an integral component of DBT. Each DBT therapist must be part of a consultation team and attend weekly meetings. The consultation team is responsible for helping the therapist to stay motivated and within the DBT therapeutic frame, applying DBT strategies and techniques to maintain an effective therapeutic relation with the patients. The consultation team encourages adherence to DBT philosophy and allows therapists to consolidate their skills and receive support, strengthening the implementation of DBT in the care they provide, and within the treatment team. Therapists who treat BPD patients need this supervision because they are often reinforced by the patient in engaging in ineffective behaviors, while being punished when engaging in effective behaviors (Linehan, 1993). For example, the patient becomes very friendly when the therapist gives up the hierarchy of targets allowing him/her to avoid talking about a recent NSSI. Furthermore, progress is slow and the therapist can become vulnerable to criticism or discouragement. The consultation team refers to dialectics, uses encouragements, avoids judgment or team divide and searches for alternative solutions when needed. Regarding NSSI and suicide behaviors, therapists are often confronted with intense emotions and such extreme behaviors can generate a high level of stress. The consultation team plays an important role in helping therapists to observe their limits and avoid a burnout. A recent study on clinicians' experiences of the consultation team shows that the meetings help maintain the therapists' motivation (Walsh et al., 2018).

DISCUSSION AND CONCLUSION

Despite mounting evidence of the positive impact of DBT in the treatment of BPD, the relative effects of specific therapeutic interventions on suicidal behaviors remain difficult to assess. It would appear that some components of DBT, such as skills training groups and individual therapy, have the same positive impact on NSSI (Linehan et al., 2015).

Suicide and NSSI are obviously targets of the therapy and elements that interfere with its prognosis and positive outcome.

Elements that have an impact on reducing NSSI and suicide among BPD patients are numerous and exist at different levels of DBT, in its range of targets, modes, strategies or types of therapeutic intervention, and in the consistency of the theoretical model and therapeutic structure. This is in keeping with various therapeutic models that have shown comparable efficacy, such as MBT, TFP and GPM, and that consider NSSI and suicide as priorities in their treatment structure, while maintaining the fundamental objective of improving quality of life (Keuroghlian et al., 2016).

Nevertheless, we still need to better understand which and how specific components of DBT reduce suicidal behaviors and for which patients. Further researches are clearly needed in this field.

PERSPECTIVES AND NEW ELEMENTS

Clinicians caring for patients exhibiting self-destructive behaviors are keenly interested in the use of new technologies. The advantage of such technologies is their immediate availability to patients. Smartphone applications have therefore been developed, either for the benefit of patients (Rizvi et al., 2011; Prada et al., 2017), or to help clinicians treating suicidal patients (Harned et al., 2017).

AUTHOR CONTRIBUTIONS

PP, NP, ER, and RN participated in equally in designing the study, in writing the different sections of the paper, and in giving their final approval for the paper to be submitted.

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Viewpoint: Toward Involvement of Caregivers in Suicide Prevention Strategies; Ethical Issues and Perspectives

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AIM

The aim of this article is to investigate the potential impacts implication of caregivers as a resource in care management of patients at risk of suicide.

SUICIDE PREVENTION CHALLENGES

Suicide prevention research faces specific challenges related to characteristics of suicide attempts and attempters (Wasserman, 2004). Suicide attempters have been described as poorly adhering to intensive treatment over time, and delivery of interventions in the emergency department can be difficult, where psychiatric staff availability is often limited or absent. The post-discharge period constitutes a critical challenge for emergency and mental health care services both in the short and long terms (Hunt et al., 2009). Given these issues, there has been growing interest in assessing the efficacy of post discharge intervention after a suicide attempt. For example, brief contact interventions (BCIs) are low resources interventions seeking to maintain long-term contact with patients after a suicide attempt (Milner et al., 2015). These interventions intent to reinforce the health care networking around the patient but only rely on mental health and emergency services. Depression, drug misuse, family and social situations are well established suicide risk factors (Zalsman et al., 2016). Recent findings also showed the correlation between sleep disturbances and suicidality from a clinical point of view (Pompili et al., 2013). Including protective factors in suicide risk management might be of great interest. However, prevention strategies often exclude form the preventative procedure an essential preventative component of patients social network: the caregiver (Mann et al., 2005). Indeed, studies showed the potential positive impacts of caregivers in the management of important suicide risk factors as depression (Joling et al., 2012), and social isolation (Chatterjee et al., 2014).

INVOLVING THE CAREGIVERS IN THE SUICIDE PREVENTION PROCESS

A caregiver, or carer, is an unpaid or paid member of a person's social network who helps them with activities of daily living. Caregiving is most commonly used to address impairments related to old age, disability, a disease, or a mental disorder (Berk et al., 2013).

Referred to as informal caregivers, caregivers provide a complex array of support tasks that extend across physical, psychological, spiritual, and emotional domains. Studies have shown that caregivers and close contacts are reliable sources of information about patients with psychiatric

disorders. Caregivers do not exactly provide medical care, but can be considered as partners in the care as suggested by Fredman and Daly (Fredman and Daly, 1993). Traditional psychiatric assessment, however, does not always include information from caregivers due to time constraints, concerns about confidentiality and the risk of caregiver burden (Adelman et al., 2014). By excluding caregivers from assessments, clinicians may miss an opportunity to obtain additional valuable information about the illness course. Including caregivers in innovative prevention strategies could strongly improve the insight regarding patients' suicide risk situation.

Moreover, the involvement of the caregivers in a patient's assessment may facilitate the implementation of a step-by-step personalized prevention program during care transitions (e.g., hospital to home). This strategy may evolve into an all-embracing, tailored partnership involving healthcare professionals, patients, and their caregiver. Furthermore, the involvement of the caregivers means that they are able to play an important part in providing support and detecting warning signs when indicated. Caregivers are potential allies in the suicide prevention without, however, taking the place of healthcare professionals (Sun and Long, 2008).

CAREGIVER INVOLVEMENT: OPPORTUNITIES AND ISSUES

Despite these promising opportunities, issues are raised regarding the assimilation of caregivers designated by patients at risk of suicide. Support for the patient on the part of his/her network in the vast majority of cases creates opportunities to relieve relatives of the strain of overwork. However, some studies have intended to involve the caregiver in a suicide prevention approach. For example, according to Sun et al., caregivers are able to play an important part in providing support and detecting warning signs and are potential allies in suicide prevention (Sun et al., 2009).

Family caregivers' suicide caring competence is important to prevent their relatives with suicidal tendencies from attempting suicide. Authors stated that clinicians and nurses are typically educated and trained to care for patients with suicidal tendencies, but family caregivers of suicidal individuals do not receive the same level of suicide care education. Family caregivers may lack competence to care for their relatives with suicidal ideations and/or behaviors. In this perspective, Sun et al. proposed an assessment of suicide caring competence which may help clinicians to assess the caring competence of family caregivers and provide proper suicide care education. In this perspective, caregiver could be involved systematically at the time of discharge of patients at suicide risk (Sun et al., 2014).

Caregivers and healthcare professionals should strive to create between themselves and with the suicidal patient a back-and-forth dynamic, wherein the risk of caregiver burden is a constant threat and urges caution on the part of all involved.

Tacitly taken for granted, the role of caregivers is at best reduced to that of auxiliaries, providing little more than emotional or material support to the patient, for whom they may as a last resort act as a spokesperson (Fredman and Daly, 1993). The patient will surely benefit from the implication of his/her caregiver in a preventative approach.

TOWARD THE INVOLVEMENT OF CAREGIVERS IN SUICIDE PREVENTION STRATEGIES?

Few studies have emphasized the family caregivers of suicidal individuals. No study has explored the relationship between family caregivers' caring stress with suicidal attitudes and suicide care ability. What does the caregiver paper adds to existing knowledge (Chiang et al., 2015)? Caregivers may be the primary interface with the health care system often receive inadequate support from health professionals and frequently feel abandoned and unrecognized by the health care system.

Mental health clinicians could help caregivers become aware of the emotional pain that suicidal people experience and then promote their positive attitudes toward their suicidal relatives. Caregivers could increase their ability to care for their suicidal relatives, which could reduce the numbers of suicides. Caregivers naturally play an essential role in supporting the well-being and care of patient at risk of suicide. Clinicians should identify their patients' caregivers, inquire about their caregiving experience, and benefit from a caregiver assessment. They should engage caregivers as proactive partners in care based on the involvement they can handle and the help they may need. We advocate that, as other preventative interventions, the efficacy of the involvement of caregivers in a suicide prevention strategy should be assessed in further researches.

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All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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Psychosocial Suicide Prevention Interventions in the Elderly: A Mini-Review of the Literature

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In Europe the elderly population is projected to increase from 18.5% (93.9 million) in 2014 to 28.7% (149.1 million) by 2080. In the United States it is estimated that by 2030 more than 20% of the population will be aged 65 years or over. This specific population is at high risk of unrecognized or untreated psychiatric illnesses and suicide. It is well known that completed suicide rate increases with age in both men and women. Although elderly people attempt suicide less often than other age groups, they show a higher completion rate. Generally, the methods chosen by elderly are more lethal, the intent is more serious, they are more determined, and they show fewer warning signs than the younger population. A recent systematic review and meta-analysis of psychosocial intervention, following self-harm in adults, found that cognitive behavioral therapy was the most effective therapy in these patients. Unfortunately, there have been few reported trials of other potentially effective interventions. Because the scientific literature on psychosocial suicide prevention interventions in the elderly is still scant, we conducted a mini-review in order to take stock of the situation. Studies were identified through electronic searches of the Cochrane library, MEDLINE, Scopus and the Web of Science databases. PRISMA guidelines were followed and only seven articles met the inclusion criteria. No firm conclusions can be drawn about this topic because there is still very little data and studies use inconsistent outcome measures and designs. Nonetheless, the existing data suggests that psychosocial interventions are promising.

Keywords: suicide, attempted suicide, elderly, psychosocial intervention, mini-review

INTRODUCTION

According to the World Health Organisation's (WHO) estimates, 800,000 people die from suicide every year (WHO, 2017). Although in some countries the suicide rate is higher amongst the young (15–29 years old), generally people aged 70 years and over have the highest suicide rate. When it comes to gender differences, men over 50 years old are particularly at risk and women 70 years old and over are twice as likely to die through suicide than younger (15–29 years old) women (Pearson and Conwell, 1995; WHO, 2014).

In Europe the elderly population is projected to increase from 18.5% (93.9 million) in 2014 to 28.7% (149.1 million) of the population by 2080 [Eurostat (n.d.)] and it is estimated that by 2030 more than 20% of the United States population will be aged 65 years or over. The elderly population is at a high risk of unrecognized or untreated psychiatric illnesses and suicide. In 2012 there was about one elderly suicide every 80 min in the United States (Ortman et al., 2014).

It is widely acknowledged that compared to other age groups, attempted suicide is less common in the elderly, whereas completed suicide is more common, probably due to the choice of more lethal means (McIntosh, 1994). Moreover, it is noticeable that intention to die tends to be greater in elderly suicide cases and elderly people usually show fewer warning signs than the younger population (Bennett and Collins, 2001). Risk factors underlying elderly suicidal behavior include: psychiatric illness (particularly affective disorders), recent loss, alcohol abuse, social isolation, perceived meaning of physical illness (pain, impact on global function), family discord, retirement, cognitive deficits, and institutionalization (Linden and Barnow, 1997; Conwell et al., 2002; Duberstein et al., 2004; Dombrovski et al., 2008).

Given this pattern of risk factors, prevention and intervention strategies targeting the specific needs of the elderly population are recommended. The current global trend in aging means it is necessary to deal with the peculiarities and specific needs of the elderly population and to plan *ad hoc* structured interventions aimed at reducing their suicide risk. Age-sensitive interventions (including psychiatric treatment if necessary), focused on physical health perception and facilitating adjustment to change, may be helpful in reducing elderly suicide risk (Crandall et al., 2007). Psychosocial interventions could be useful, including traditional psychotherapy interventions, as well as self-help groups, case management strategies and psychosocial rehabilitation techniques.

A recent systematic review and meta-analysis of psychosocial interventions following self-harm in adults, suggested that cognitive behavioral therapy is the most effective approach in these patients (Hawton et al., 2016). Unfortunately, there is a dearth of literature on psychosocial interventions focused on suicide prevention in the elderly.

Our aim was therefore to perform a mini-review of the literature on suicide prevention in the elderly, using the search string shown in **Appendix 1**.

MATERIALS AND METHODS

Selection of Studies

The inclusion criterions were:

- Description or report of psychosocial intervention(s) with a focus on preventing suicidal thoughts and behaviors in elderly populations.
- Design: randomized controlled trial (RCTs), quasi-experimental (e.g., non-randomized controlled studies and before-and-after studies), observational, case-report.

Exclusion criteria were:

- Reviews and meta-analyses.
- Papers not written in English.

Data Sources and Search Strategy

Four electronic databases (PubMed, Scopus, Cochrane Library, and the Web of Science) were searched from their inception up to 31st January 2018, with the search strings reported in

Appendix 1. Articles were selected in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2015; Shamseer et al., 2015).

Two reviewers (EG and MM) independently selected titles, abstracts and full-text publications using the inclusion and exclusion criteria specified above. Disagreements were resolved through discussion with a third reviewer (CG).

We extracted the following information from all publications: country, design, characteristics of study participants, characteristics of the psychosocial interventions described, and a summary of the main study findings which focused on suicide. Ethical statements were not provided in the studies included.

RESULTS

The search retrieved 144 articles; 127 articles remained after duplicates were removed. Twelve articles were excluded because they were not written in English, 23 were excluded based on the title (not relevant to the topic) and six were excluded due to the type of publication (reviews and meta-analyses). A further 68 articles were excluded based on the abstract (not relevant) and one full text article was not available. Most of the articles which were excluded were not focused on the selected study population (elderly population), on the selected intervention (psychosocial intervention) or on the intervention target (suicide prevention). Three eligible articles were identified through the database search and four from other sources, thus seven articles were included in this mini-review. The PRISMA flowchart is shown in **Figure 1**.

One of the selected articles (Bruce and Pearson, 1999) described the Prevention of Suicide in Primary Care Elderly: Collaborative Trial (PROSPECT), a study involving 18 primary care practices that aimed to promote the recognition and treatment of depression and identifying depression as one of the most important risk factors for suicide behaviors in the elderly population. PROSPECT implemented procedures designed to facilitate the use of an algorithm for detecting and treating depression. The PROSPECT algorithm recommended antidepressant pharmacotherapy as the first-line intervention and psychotherapy – in particular interpersonal therapy – as the second-line treatment. At each step the physician could request a psychiatric consultation or refer the patient to a specialist. The PROSPECT intervention added a mental health specialist to the primary care setting. The role of these specialists was to obtain information from patients that would help physicians recognize depression, to offer recommendations and to help educate patients, families and physicians about depression and suicidal ideation. The patients involved were >60 years old, cognitively intact and not institutionalized. Telephone screening for depression was carried out using the Center for Epidemiologic Studies Depression (CESD) scale. People identified with having depression and a small percentage of patients without depression were recruited and invited to a face-to-face interview, to assess depression and other clinical, neuropsychological and social variables necessary for the evaluation of depression and suicide

FIGURE 1 | PRISMA flowchart.
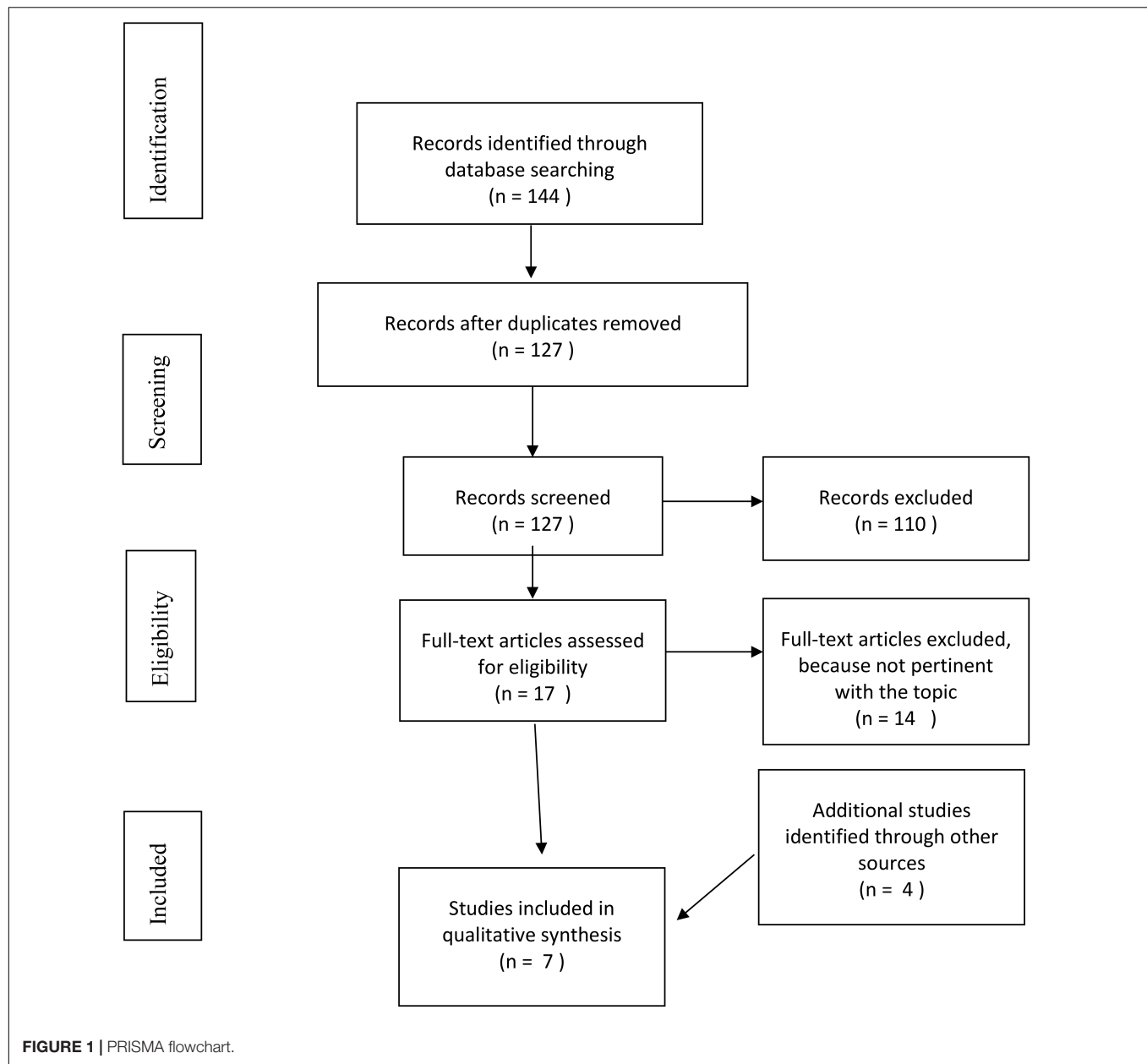
risk. After the assessment the patient's chart was reviewed by a mental health specialist, who then contacted the physician with recommendations after which intervention procedures started. Recruited patients were contacted again by telephone 4 and 8 months later, in order to assess depressive symptoms, suicide ideation and use of health care services.

In a later article, Bruce et al. (2004) compared the method described above with usual care. Patients who received the PROSPECT intervention showed a greater decrease in depressive symptoms than those who received the usual care ($p < 0.001$). Moreover, a faster reduction in suicidal ideation rate was observed in the PROSPECT group ($p = 0.01$).

Another article (Fiske and Arbore, 2001) evaluated a geriatric outreach program for older people potentially at risk of

suicide. The intervention group comprised of 148 elderly people ($M = 76.9$ years, $SD = 9.0$) and the control group of 70 individuals (mean age $\pm$ SD, 73.6 $\pm$ 7.9). The program consisted of scheduled calls that included well-being checks and emotional support, and weekly home counseling visits. Participants also had access to a 24 h telephone hotline. Suicide risk was evaluated by asking participants about their current and prior suicidal behavior (e.g., "Have you ever thought of killing yourself?", "Have you ever tried to kill yourself?", "Are you feeling suicidal now?"), 42% of the intervention group had a lifetime history of suicidal thoughts and 14% had attempted suicide previously; in the control group the corresponding percentages were 30 and 7%. Participants who reported a history of suicidal thoughts were more likely to have a high level of depressive

symptoms (measured with the short form of the Geriatric Depression Scale; $p < 0.01$) and a high level of hopelessness (measured with the Geriatric Hopelessness Scale; $p < 0.01$). The 218 participants were contacted for another interview after 1 year. The results showed that after the intervention, the intervention group showed a reduction in hopelessness levels, which may indicate a reduction in suicide risk given that numerous studies have shown a link between hopelessness and suicidality.

Heisel et al. (2009, 2015) conducted a pre- to post-treatment psychotherapy trial involving 17 older patients (M age = 70.1 years, SD = 5.4) who were assessed for multiple late-life suicide risk factors using specific tests. Suicidal ideation was evaluated with the Geriatric Scale for Suicide Ideation (GSIS). Participants were offered a course of 16 weekly 50 to 60-min sessions of outpatient interpersonal psychotherapy, tailored to older adults at risk for suicide. Participants were helped to identify the factors that were contributing to their psychological pain and to alleviate feelings of desperation, which are common amongst depressed older patients, and opportunities to enhance social connections were identified. In the later phase of treatment, patients were encouraged to continue to develop interpersonal relationships and meaningful post-therapy pursuits. Participants, when they wished, were allowed to continue with therapy after the 16 scheduled sessions. A safety protocol was implemented to try to prevent potentially dangerous situations; this provided suggestions for family members or caregivers of the participants and 24/7 mobile phone access to the study therapist in case of emergency. The intervention produced reductions in suicide ideation (p = 0.003) and severity of depression symptoms (p = 0.001) whilst social adjustment, enjoyment of social and leisure activities increased (p = 0.001).

Kiosses et al. (2015) compared the efficacy of Problem Adaptation Therapy (PATH) and Supportive Therapy for Cognitively Impaired Older Adults (ST-CI) in a randomized controlled trial involving 39 older adults (age ≥65 years; M = 82.5, SD = 7.16) with unipolar, non-psychotic major depressive disorder, mild or moderate dementia and disability. Both psychosocial interventions were home-delivered and lasted 12 weeks. PATH is designed to reduce depression, depression-related symptoms and disability in elderly patients with depression and cognitive impairment, using a problem-solving approach, compensatory strategies, tools (e.g., calendar, notes, signs, notebook) and environmental adaptations. If the patient was unable to improve his or her emotional regulation with the help of the PATH tools, then the caregiver was asked to get involved. ST-CI is a non-specific therapeutic approach including empathetic listening, encouragement and understanding. It is based on Carl Rogers' theory and differs from psychotherapies such as problem-solving therapy, interpersonal therapy, or cognitive behavioral therapy. Both the approaches were originally developed for patients with cognitive impairment. Participants' suicidal ideation was assessed at baseline and every 4 weeks thereafter, using the suicide item (#16) of

the Cornell Scale for Depression in Dementia (CSDD). After 12 weeks of treatment both the PATH and ST-CI groups showed similar reductions in suicidal ideation (p = 0.002).

The final study (Sirey et al., 2016) compared a service referral control condition, with an Open Door intervention in 161 older adults (age ≥60 years), who were eligible for home meal service in the United States. In contrast with the previous study, cognitive impairment (Mini Mental State Exam <24) was an exclusion criterion. Patients were randomized to the service referral group (M = 81 years, SD = 9.5) or the Open Door group (M = 82.9 years, SD = 9.0). The Open Door intervention is a brief, five-step, individualized psychosocial intervention designed to improve depression and its correlates. Sessions are delivered by a counselor who uses motivational interviewing to activate the individual's wish to seek help. Both interventions lasted 8 weeks (three face-to-face visits during the first 6 weeks and one telephone meeting after 15 days) and suicidal ideation was evaluated using the Suicide Risk Assessment scale. Almost one third (26.7%) of all participants reported suicidal ideation at the baseline. No significant association was found between suicide risk and ethnicity, age, gender, or education. Unfortunately, suicide risk was not evaluated after the intervention.

DISCUSSION

Some of the psychosocial interventions investigated in the selected articles appear to be effective in reducing suicidal ideation in the elderly, namely the PROSPECT intervention, PATH, ST-CI and outpatient interpersonal psychotherapy tailored to older adults (Bruce and Pearson, 1999; Bruce et al., 2004; Heisel et al., 2009, 2015; Kiosses et al., 2015). One study did not measure the impact of the psychosocial intervention on suicide risk, but argued that the observed reduction in hopelessness levels should translate into lower suicide risk (Fiske and Arbore, 2001). Finally, in one of the studies, suicide risk was assessed before the intervention, when about one third of participants reported suicidal ideation, but not after the intervention (Sirey et al., 2016).

Given the high risk of suicide in the elderly (WHO, 2014), the paucity of literature on psychosocial interventions designed to prevent suicide in the elderly is surprising. This mini-review found only seven relevant studies, some rather outdated and others more recent. The studies were diverse with respect to intervention and assessment methods. The PROSPECT intervention investigated the impact of physician knowledge in the primary care setting (pharmacotherapy and/or interpersonal therapy) and depression care managers (Bruce and Pearson, 1999; Bruce et al., 2004). Another study used a telephone-based geriatric outreach program to provide emotional support to older people considered at risk for suicide (Fiske and Arbore, 2001). The PATH intervention relied instead on a problem-solving approach and ST-CI was based on the Carl Rogers' theory. The Open Door intervention Heisel et al. (2009, 2015) used interpersonal psychotherapy tailored to older adults at risk for suicide, to help participants deal with psychological pain and

desperation. The samples of older adults recruited in the studies were also very diverse; Fiske and Arbore recruited a slightly younger sample (M = 76.9 years, SD = 9.0) than the others. Some of the interventions described were tailored specifically to older adults with dementia (Kiosses et al., 2015), whereas other studies specifically excluded patients with cognitive impairment (Sirey et al., 2016). This heterogeneity means that the interventions cannot be compared.

Given that suicide risk is high in the elderly population and we live in an aging society, suicide prevention in the elderly is a topic that deserves more attention. It is notable that in the elderly suicide and the wish to die may be related to anxiety, social isolation, loneliness, pain, disability and institutionalization as well as to specific psychopathological conditions, such as depression, which can be treated psychopharmacologically (Linden and Barnow, 1997; Almeida et al., 2012). The former factors might be more amenable to psychosocial treatments than psychopharmacology. Psychosocial interventions should be encouraged given the limitations of medical treatment in older people, for example the moderate effects, drug-drug interactions and increased vulnerability to side effects (Dines et al., 2014).

Although there have been several studies of psychosocial interventions in adults (Hawton et al., 2016), research focusing specifically on elderly people is scarce. The few studies we found, their limitations notwithstanding, suggest that psychosocial interventions have promise as a method of reducing suicide in the elderly. In conclusion, suicide risk assessment should be part of the standard psychiatric assessment in geriatric patients and it is important that effective psychosocial suicide prevention interventions are developed to target the specific needs of this population (Aftab and Shah, 2017).

We found few studies, and the heterogeneity of samples and assessment methods made it difficult to compare the interventions described, but overall the results were promising. Articles reviewed suggested that it is important to assess suicide risk in older people. Once people at risk are identified, appropriate psychosocial interventions should be adopted. Furthermore, there is a need for studies which implement appropriate follow-up, including re-evaluation of suicide risk after intervention. Finally, as the two most important parameters in the field of psychosocial rehabilitation, efficacy, and cost-effectiveness should be taken into account in studies dealing with this topic.

AUTHOR CONTRIBUTIONS

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

APPENDIX 1

Search engine	Search string
Cochrane library	("suicide") AND ("psychosocial intervention") AND ("elderly")
PubMed	[(suicide) AND psychosocial intervention] AND elderly
Scopus	[TITLE-ABS-KEY (suicide) AND TITLE-ABS-KEY (psychosocial AND intervention) AND TITLE-ABS-KEY (elderly)]
Web of science	"suicide" AND "psychosocial intervention" AND "elderly"

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Treatment Engagement in Specific Psychological Treatment vs. Treatment as Usual for Adolescents With Self-Harm: Systematic Review and Meta-Analysis

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Background: Self-harm is a major public health problem. It is one of the best predictors of suicide in adolescents. Despite recent advances in the understanding of self-harm, poor treatment engagement remains a significant clinical obstacle.

Objectives: The purpose of this meta-analysis is to update and extend previous research investigating treatment engagement with specific psychological treatments (SPT) vs. treatment as usual (TAU) in adolescents who self-harm.

Methods: Data sources were identified by searching the Medline, PsychINFO, EMBASE, and PubMed databases as of October 2017. Randomized Controlled Trials (RCTs) comparing SPT and TAU in adolescents (through age 18 years) with self-harm were included.

Results: The results show that 12 RCTs investigating 1,255 young people were included in the meta-analysis. The proportion of adolescents not completing four or more sessions in SPT was significantly lower (28.4%, 179/630) than TAU (45.9%, 287/625), RR = 0.64 (95% CI:0.51 −0.79), $p < 0.0001$. There were significantly more adolescents engaged with SPT than TAU.

Conclusions: Specific psychological treatments should be offered to adolescents with self-harm to maximize treatment engagement. Engaging adolescents with psychological treatment is necessary although not sufficient to achieve treatment goals.

Keywords: self harm, randomized controlled trials, meta-analysis, self injurious behavior, psychotherapy

INTRODUCTION

Suicide is the second or third leading cause of death in adolescents in Western countries and a major cause of death in developing countries (Hawton et al., 2012; World Health Organization, 2014). Self-harm is also a strong predictor of death by suicide in adolescents and a major public health concern in many countries. Thirteen to Forty-five percentage of adolescents have engaged in self-harm at some point of their lives in community samples, while this rate is up to 40–60% in clinical samples (Nock, 2010). Self-harm in adolescents is associated with 50- to 100-fold increase in the risk of death by suicide.

It is also associated with a wide range of psychiatric disorders, such as depression and borderline personality disorder, and high health economic expenditure (National Institute for Health Care Excellence, 2011). Given the high rates of self-harm in adolescents, a recently developed screening too, the Self Harm Questionnaire (SHQ) has improved on identification and prediction of self-harm (Ougrin and Boege, 2013). Twenty percentage of those who disclosed self-harm on the SHQ did not have self-harm recorded in their clinical records and it was later found that self-harm had occurred. The availability of such screening tool helps to identify adolescents who are at an increased risk for suicide. A combination of clinical assessment and self-report questionnaire would be optimal for identification of self-harm in adolescents.

Several psychological therapies have shown an impact on self-harm ideation and behavior in adolescents (Ougrin et al., 2015). However, a systematic review revealed that only over half of these programs had a significant effect on self-harm, suicidal ideation, or suicide attempts (Calear et al., 2016). On the other side, poor attendance and engagement remains to be a significant obstacle in delivering these interventions (Fortune and Hawton, 2005). Previous research indicates that community treatment is poorly attended, with 25–50% of self-harming adolescents reported not to attend any follow-up sessions (Taylor and Stansfeld, 1984; Granboulan et al., 2001). Fifty to Seventy-Seven percentage of adolescents disengage from treatment (Trautman et al., 1993; Haw et al., 2002; Groholt and Ekeberg, 2009), while around 50% of adolescents attend four or fewer outpatient follow-up sessions (Spirito et al., 1992; Groholt and Ekeberg, 2009). Disengagement is a problematic coping style incorporating problem avoidance, wishful thinking, social withdrawal, and avoidance of negative emotions and could lead to poor psychosocial outcome (Votta and Manion, 2004).

There has been an increasing number of controlled studies of specific psychological therapy for adolescents who self-harm. A meta-analysis was conducted in 2011 to investigate whether specific psychological therapies vs. usual care increase engagement in adolescents who self-harm, but no significant difference was found (Ougrin and Latif, 2011). The small number of studies did not allow for further analysis such as evaluating the moderators. Another meta-analysis investigated the effects of specific therapeutic treatment and intervention in reducing suicidal and non-suicidal self-harm in adolescents (Ougrin et al., 2015). Overall, specific pharmacological, social or psychological therapeutic interventions were more effective than usual care including treatment as usual, enhanced treatment as usual, supportive relationship treatment and hospitalization. There is also evidence that intensive community treatment is associated with reduced risk of multiple self-harm in comparison with standard inpatient treatment (Ougrin et al., 2014, 2018; Kwok et al., 2016). Treatment engagement is essential for treatments and interventions to be effective. Therefore, this meta-analysis seeks to update and extend previous research in comparing treatment engagement between psychological therapy and treatment as usual. The availability of newer research studies allows for stricter inclusion criteria and further analyses

including moderator analyses. This provides more generalizable findings, leading to greater insight to future research and clinical work.

METHODS

Inclusion Criteria

We included all randomized controlled trials of specific psychological treatment (SPT) compared to treatment as usual (TAU) for adolescents through age 18 who have self-harmed at least once. Adolescents from different cultural background and socioeconomic statuses are considered. SPT is defined as any theoretically coherent non-pharmacological intervention that are manualized or replicable by others. Interventions considered including home-based intervention, group psychotherapy, family therapy, and therapy focused on the adolescent, etc. TAU is defined as any intervention that reflects the usual care in a given treatment setting with patients receiving typical follow-up appointments and services.

Exclusion Criteria

We excluded studies in which adolescents who self-harm, parasuicidal behaviors, suicidal ideation, or behavior was not presented as a main inclusion criterion; studies that involved pharmacological intervention; studies with interventions that did not require young people to attend treatment sessions; and studies that did not measure engagement systematically, such as recording the number of attended sessions of each participant.

Identification and Selection of Data

Articles were identified by systematically searching PsycINFO, PubMed, Embase and OVIDMedline databases to October 2017. The MeSH terms used were "self injurious behavior," "suicide, attempted," "self mutilation," "suicide," "overdose," and "self harm, deliberate." Limits of age group (0–18 years old) and of publication types (randomized controlled trials) were applied. The search results were imported into EndNote (version X7) and all duplicates were removed.

The reference lists and cited articles were searched and relevant studies were evaluated for inclusion. Key investigators from the United Kingdom, United States, Australia and Norway were contacted for any unpublished studies or to clarify details of the published studies.

The search was completed by two of the authors (SY and KK) independently. The two authors screened the titles, abstracts, and full text articles to determine the eligibility of the studies. There were no disagreements during consensus meeting.

Allocation concealment was used as a proxy to assess the methodological quality of the studies. Allocation concealment is a procedure for protecting the randomization process so that the treatment to be allocated is not known until the participant is in the study. Allocation concealment was rated using the following quality ratings: 1 = adequate concealment (e.g., sealed envelope), 2 = unclear concealment, and 3 = inadequate concealment (e.g., open random number tables). Jadad score was also calculated for each included studies (Jadad et al., 1996). Jadad score is an indicator of methodological quality, which assesses the

quality of randomization, blinding procedures, and description of withdrawals and dropouts. The score ranges from 0 to 5 while studies scoring 3 or above would be considered as good quality.

Self-harm was defined as an act with a non-fatal outcome in which an individual deliberately initiated behavior intended to cause self-injury, ingested a substance in excess of prescribed or generally recognized therapeutic dose, ingested recreational or illicit drug that the person regarded as self-harmful, or ingested a non-ingestible substance or object (Hawton et al., 2002). Engagement was defined as attending four or more psychotherapeutic treatment sessions, in line with previous literature (Wood et al., 2001; Spirito et al., 2002). We contacted key investigators for clarifications wherever needed.

Statistical Analysis

We used attending four or more psychotherapeutic treatment sessions to calculate the risk ratio. We dichotomized the subjects into two different groups by using attending four or more treatment sessions as a cutoff. Data were obtained by contacting key investigators if they were not already specified in the paper. RevMan (Version 5.2), a computer program designed to support Cochrane reviews and meta-analyses, was used to calculate the pooled effect size. Each study was weighted in proportion to its sample size and tau^2 (the estimated variance of the true effect sizes).

There was moderate heterogeneity as indicated by the I^2 statistic. I^2 describes the percentage of total variation between studies that is due to heterogeneity rather than by chance (Higgins et al., 2003). In order to allow for heterogeneity, mean risk ratio was calculated with random effects model (DerSimonian and Laird, 1986). A random effects model assumes that individual studies are estimating different treatment effects due to the diversity of methodology and clinical interventions. A funnel plot was utilized to assess the presence of publication bias for the main hypothesis of treatment engagement in SPT vs. TAU for adolescents with self-harm. Egger's test was used to formally assess publication bias (Egger et al., 1997). After the removal of the studies with Jadad ≤ 2 in the sensitivity analysis, there is little variation between the studies, making a fixed effects model more appropriate.

Finally, meta-regression was completed to assess the influence of number of training sessions (single vs. multiple), year of study, mean age (years), and gender percentage on the effect size.

RESULTS

Included Studies

The original search resulted in 1,136 articles and 470 duplicates were removed. Four additional articles were identified through the reference lists and from the sharing of other researchers. The remaining articles were screened for abstract and 27 articles were examined for full-text (Cotgrove et al., 1995; Harrington et al., 1998; Wood et al., 2001; Spirito et al., 2002; Huey et al., 2004; Donaldson et al., 2005; King et al., 2006, 2009; Chanen et al., 2008; Hazell et al., 2009; Schuppert et al., 2009, 2012; Diamond et al., 2010; Asarnow et al., 2011, 2017; Esposito-Smythers et al., 2011; Green et al., 2011; Ougrin et al., 2011, 2013; Rossouw and

Fonagy, 2012; Alavi et al., 2013; Hughes and Asarnow, 2013; Pineda and Dadds, 2013; Mehlum et al., 2014, 2016; Goodyer et al., 2017; Wharff et al., 2017). A summary of the process is presented in **Figure 1**. A total of 16 articles met full inclusion criteria as randomized controlled trials of adolescents with self-harm of suicidality as primary presenting problem (Harrington et al., 1998; Wood et al., 2001; Spirito et al., 2002; Donaldson et al., 2005; Chanen et al., 2008; Hazell et al., 2009; Schuppert et al., 2009, 2012; Diamond et al., 2010; Asarnow et al., 2011; Esposito-Smythers et al., 2011; Green et al., 2011; Ougrin et al., 2011; Rossouw and Fonagy, 2012; Mehlum et al., 2014; Wharff et al., 2017). Four of the studies did not report the data in the format required and hence were not included in the meta-analysis (Schuppert et al., 2009, 2012; Rossouw and Fonagy, 2012; Wharff et al., 2017). The characteristics of the included 12 studies are presented in **Table 1**.

Allocation concealment was adequate in ten of the studies (Harrington et al., 1998; Wood et al., 2001; Chanen et al., 2008; Hazell et al., 2009; Diamond et al., 2010; Asarnow et al., 2011; Esposito-Smythers et al., 2011; Green et al., 2011; Ougrin et al., 2011; Mehlum et al., 2014), while it was unclear in two of the studies (Spirito et al., 2002; Donaldson et al., 2005). The Jadad scores were 3 in eight of the studies (Wood et al., 2001; Chanen et al., 2008; Hazell et al., 2009; Asarnow et al., 2011; Esposito-Smythers et al., 2011; Green et al., 2011; Ougrin et al., 2011; Mehlum et al., 2014), 2 in two studies (Harrington et al., 1998; Diamond et al., 2010) and 1 in two studies (Spirito et al., 2002; Donaldson et al., 2005). Disagreements were resolved by a consensus meeting between two of the authors.

Different types of SPT were used in the studies, including: family-based cognitive-behavioral therapy to increase motivation for engagement and care linkage telephone contacts (Asarnow et al., 2011); problem-solving intervention designed to increase adherence to outpatient treatment (Spirito et al., 2002); attachment-based family therapy targeting family processes associated with depression and suicide (Diamond et al., 2010); cognitive analytic therapy (CAT) as early intervention for complex and relational disorders especially borderline personality disorder (Chanen et al., 2008); developmental group psychotherapy incorporating techniques from cognitive behavioral therapy, dialectical behavior therapy, and group psychotherapy (Wood et al., 2001; Hazell et al., 2009; Green et al., 2011); modified dialectical behavior therapy (DBT-A) for self-harm adolescents with borderline personality traits (Mehlum et al., 2014); home-based family intervention by child psychiatric social workers (Harrington et al., 1998); individualized cognitive-behavioral skill-based treatment (SBT) targeting problem solving and affect management skills in adolescents who attempt suicide (Donaldson et al., 2005); integrated outpatient cognitive behavioral intervention to remediate maladaptive cognitions and behaviors in adolescents with co-occurring alcohol or other drug use disorder and suicidality (Esposito-Smythers et al., 2011); and therapeutic assessment, a brief intervention based on CAT, on identifying target problem, enhancing motivation and exploring potential ways to change (Ougrin et al., 2011). These interventions were compared to a variety of control treatments, including TAU, enhanced TAU, assessment as usual

FIGURE 1 | Flow of studies.
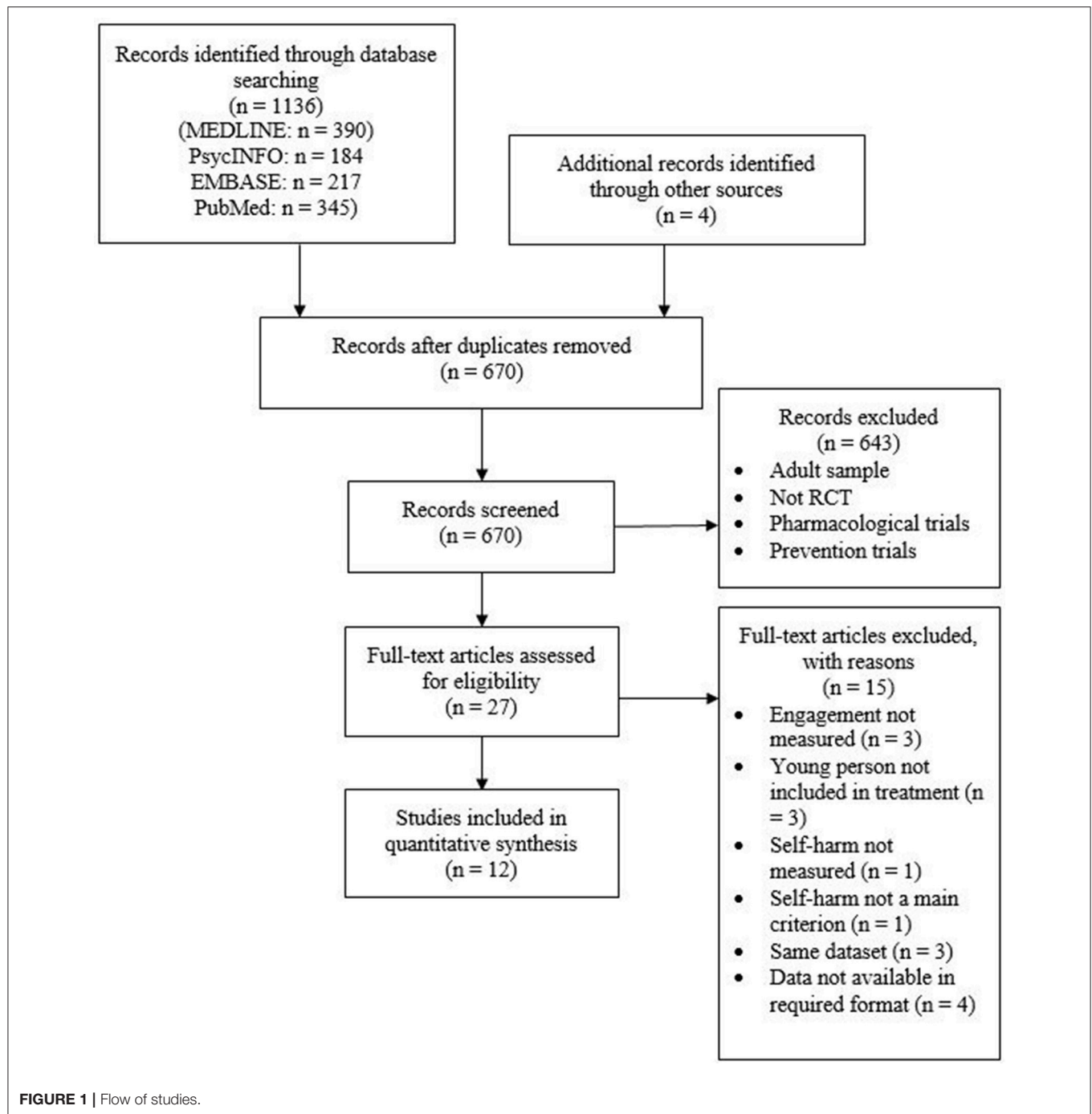
and supportive relationship treatment. These control treatments will be referred as "treatment as usual" (TAU).

Effects of SPT vs. TAU on Treatment Engagement

A full summary of participants' flow and engagement is presented in **Table 2**. Treatment engagement with SPT and TAU was compared in the 12 included studies ($n = 1,255$). SPT vs. TAU was associated with statistically significant improvement in engagement. The number of subjects not completing four

or more sessions is statistically significant between SPT (28.4%, 179/630) than TAU (45.9%, 287/625), RR = 0.64 (95% CI:0.51–0.79, $p < 0.0001$). A significant heterogeneity was found amongst the studies ($I^2 = 48\%$, $p = 0.03$). Complete table of data analysis is presented in **Figure 2**.

Four studies with Jadad scores ≤ 2 were removed in order to perform a sensitivity analysis using fixed effects model. The overall effect in the remaining eight studies remained robust ($p < 0.00001$) in the number of subjects not completing four or more sessions between SPT (29.3%, 137/460) than TAU (43.9%,

TABLE 1 | Characteristic of studies.

First author, year, country	N	Age	Female %	Inclusion criteria	Interventions	Control	ITT	Allocation	Follow-up
Harrington et al. (1998), UK	162	10–16	89.5	Diagnosis of deliberate self-poisoning	Home-based family intervention + TAU	TAU	Subjects randomized	Concealed	6 mos.
Wood et al. (2001), UK	63	12–16	77.8	Self-harm repeater in outpatient service	Developmental group psychotherapy + TAU	TAU	Subjects randomized	Concealed	7 mos.
Spirito et al. (2002), US	76	12–18	90.5	Suicide attempters receiving care in ED or pediatric ward	Compliance enhancement Intervention + Standard disposition planning	Standard disposition planning	Subjects completed	Not specified	3 mos.
Donaldson et al. (2005), US	39	12–17	82.1	Suicide attempters in ED or inpatient unit in child psychiatric hospital	Skills-based treatment (SBT)	Supportive relationship treatment (SRT)	Subjects started	Not specified	6 mos.
Chanen et al. (2008). AU	86	15–18	75.6	DSM-IV criteria for BPD	Cognitive analytic therapy (CAT)	Good clinical care (GCC)	Subjects randomized	Concealed	24 mos.
Hazell et al. (2009), AU	72	12–16	90.3	Self-harm repeater in outpatient service	Developmental group psychotherapy	TAU	Subjects randomized	Concealed	12 mos.
Diamond et al. (2010), US	66	12–17	83.3	Patients with suicide thoughts and moderate depression from primary care and emergency rooms	Attachment-based Family Therapy (ABFT)	Enhanced Usual Care (EUC)	Subjects randomized	Concealed	24 weeks
Esposito-Smythers et al. (2011), US	40	13–17	66.7	Suicide attempters in inpatient unit, or with suicidal ideation, and with alcohol or cannabis use disorder	Integrated outpatient cognitive behavioral therapy (I-CBT)	Enhanced Treatment As Usual (E-TAU)	Subjects completed	Concealed	18 mos.
Asarnow et al. (2011), US	181	10–18	69.1	Suicide attempters in ED, or with suicidal ideation	Family intervention for suicide prevention (FISP)	TAU	Subjects completed	Concealed	~2 mos.
Ougrin et al. (2011), UK	70	12–18	80.0	Adolescents referred for assessment for self-harm	Therapeutic intervention (TA)	AAU	Subjects randomized	Concealed	3 mos.
Green et al. (2011), UK	366	12–17	88.5	Self-harm repeaters in CAMHS service	Developmental group psychotherapy	TAU	Subjects completed	Concealed	12 mos.
Mehlum et al. (2014), Norway	77	12–18	88.3	Self-harm repeaters in CAMHS who meet some criteria for DSM-IV BPD	Dialectical behavior therapy (DBT-A)	Enhanced usual care (EUC)	Subjects randomized	Concealed	4 mos.

BPD, borderline personality disorder; SPT, specific psychological treatment; TAU, treatment as usual; AAU, Assessment as usual; ED, emergency department; ITT, intention to treat.

204/465), RR = 0.69 (95% CI:0.59–0.82). Complete table of data is presented in **Figure 3**.

Meta-Regression

Meta-regression was performed to assess the influence of the number of training sessions (single vs. multiple), year of study, mean age and gender on the effect size. None of the study characteristic variables showed a significant moderating effect on treatment engagement. For trials with single training session, the pooled effect in the number of subjects not completing four or more sessions between SPT (52.5%, 72/137) and TAU (66.2%, 100/150) was not statistically significant, RR = 0.78 (95% CI:0.65–0.93, $p = 0.486$). For trials with multiple training session, the pooled effect in the number of subjects not completing four

or more sessions between SPT (21.7%, 107/493) and TAU (39.5%, 187/474) was also not statistically significant, RR = 0.57 (95% CI:0.43–0.75, $p = 0.145$). The RR for not completing four or more sessions was therefore slightly lower in the multiple session trial when compared to the single training session group. The difference in relative risk was –0.32 (95% CI: −0.69–0.049, $t = −1.86$, $p = 0.089$). The number of sessions did not have a significant moderating effect on outcome. For the year of study, the mean difference in relative risk was 0.0191 (95% CI: −0.023–0.061, $t = 0.14$, $p = 0.371$). The mean difference in relative risk for percentage of female was −0.0204 (95%CI: −0.0426–0.0017, $t = −2.00$, $p = 0.0706$). Finally, the mean difference in relative risk for mean age was 0.0198 (95% CI: −0.431–0.471, $t = 0.088$, $p = 0.931$).

FIGURE 2 | Effects of specific psychological treatment (SPT) vs. treatment as usual (TAU) on treatment engagement in self-harming adolescents. M-H = Mantel-Haenszel.

FIGURE 3 | Effects of specific psychological treatment (SPT) vs. treatment as usual (TAU) on treatment engagement in self-harming adolescents (Studies with Jaded score >2). M-H = Mantel-Haenszel.
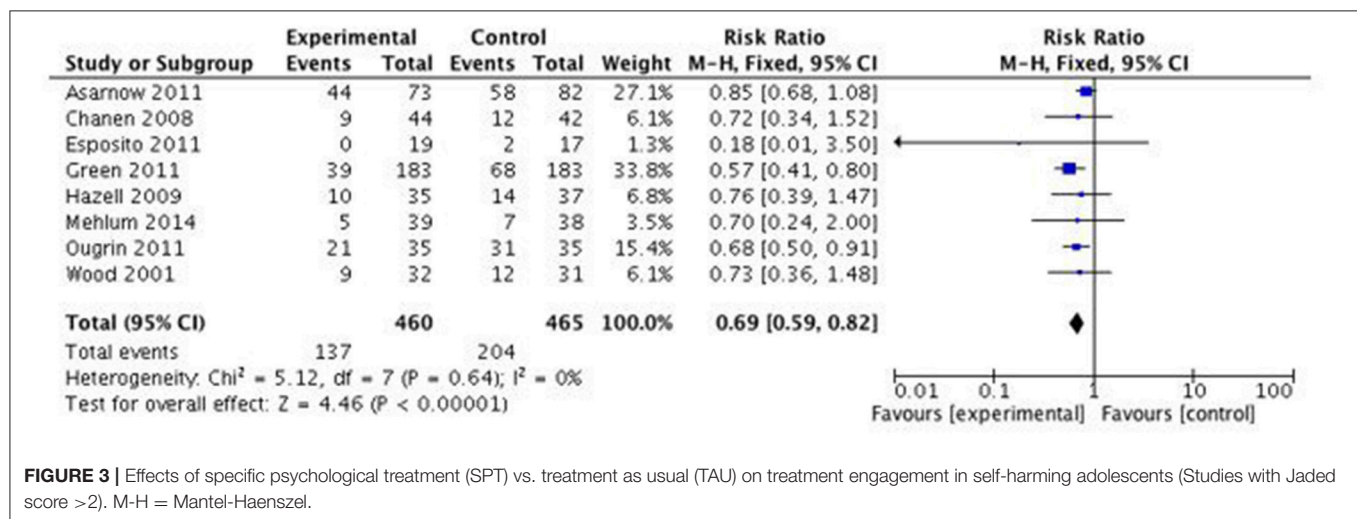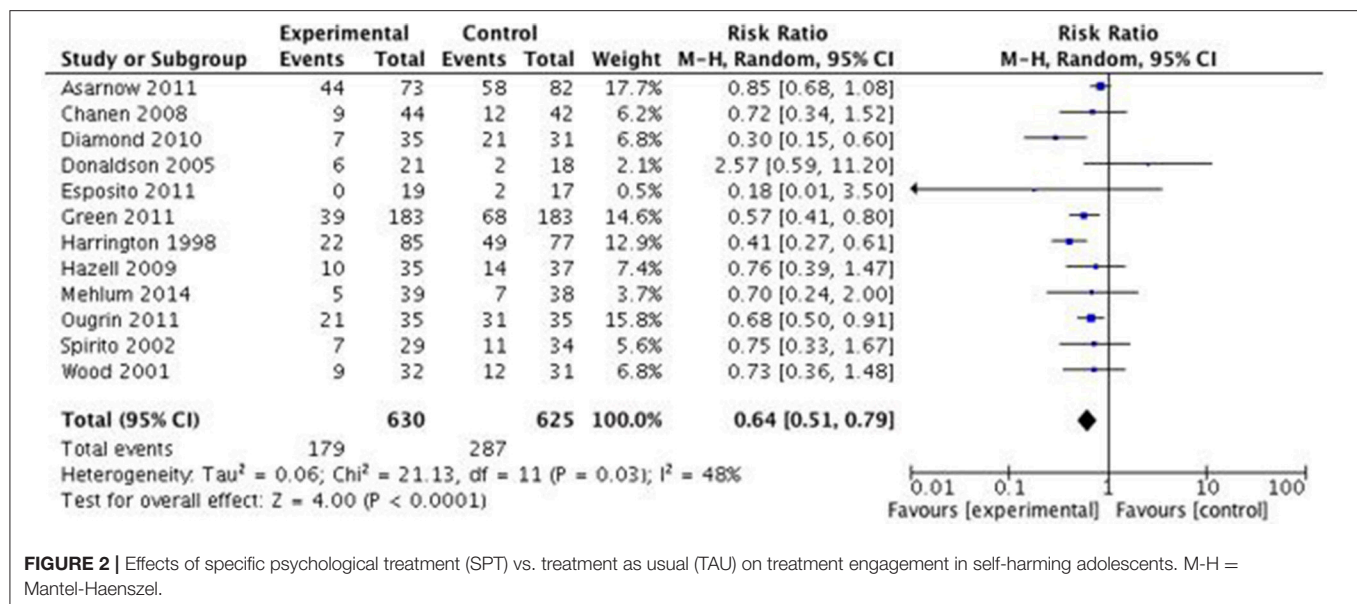
Funnel Plots and Risk of Bias

There was little evidence of funnel plot asymmetry in this meta-analysis, suggesting that there is no significant publication bias. The funnel plot is presented in **Figure 4**. The results of Egger's tests indicate that there was no publication bias ($p = 0.64$).

DISCUSSION

In this meta-analysis, results have shown evidence that SPT leads to better treatment engagement than TAU. Along with the results on efficacy in a recent meta-analysis (Ougrin et al., 2015), the results of the present study support the value of SPT in the management of self-harm. To our knowledge this is the first meta-analysis to demonstrate that offering SPT not only reduces self-harm in adolescents but also increases engagement with

treatment. The results of this meta-analysis are different from a previous meta-analysis (Ougrin and Latif, 2011) which failed to demonstrate differential engagement between SPT and TAU. One possible explanation is that the first meta-analysis lacked power to demonstrate this differential effect. Despite this, ∼30% of adolescents fail to engage with SPT indicating significant challenges for future research.

Meta-regression has revealed that none of the moderators have a significant moderating effect on treatment engagement, although a weak effect is seen for number of training sessions (single vs. multiple) and the percentage of female. There is a lower risk for multiple training sessions than in single training sessions in SPT compared to TAU. This may imply the importance of having a multiple session treatment although further research is needed, particularly on establishing a minimum of number of sessions required. Furthermore, studies with a higher proportion

TABLE 2 | Participants' flow and treatment engagement reporting effect of SPT vs. TAU.

Study	Eligible	Randomized		Completed Follow-up	Attended 4 or more sessions		Mean total N of sessions attended		Allocation concealment Q
		SPT	TAU		SPT	TAU	SPT	TAU	
Harrington et al. (1998)	288	85	77	149	63	28	7.6	3.6	1
Wood et al. (2001)	83	32	31	62	23	19	11.5*	4*	1
Spirito et al. (2002)	82	36	40	63	22	23	7.7	6.4	2
Donaldson et al. (2005)	44	21	18	31	15	16	9.7	9.5	2
Chanen et al. (2008)	106	44	42	78	35	30	13*	11*	1
Hazell et al. (2009)	133	35	37	68	25	23	8.8	Not reported	1
Diamond et al. (2010)	69	35	31	57	28	10	9.71	2.87	1
Asarnow et al. (2011)	254	89	92	135	29	24	5.3	3.1	1
Esposito-Smythers et al. (2011)	69	20	20	36	19	15	45.7	24.6	1
Ougrin et al. (2011)	73	35	35	60	14	4	2*	0*	1
Green et al. (2011)	366	183	183	359	144	115	8.5	9.7	1
Mehlum et al. (2014)	77	39	38	77	34	31	30.9	21.3	1

*Median was reported.

of female adolescents seem to have a lower risk for not attending four or more sessions, which may imply that female adolescents may have better treatment engagement in SPT compared to TAU. There has been little research done regarding gender differences in treatment engagement. Generally, more females than males seek help for mental health problems while the compliance of male patients is poorer than that of females in actual clinical settings (Hawton, 2000). Similar gender differences have been found in treatment programs for substance abusers, where female programs have significantly higher scores in counselor rapport and treatment participation, with gender being a significant moderator (Staton-Tindall et al., 2007). It is also often recommended to provide multi-session training sessions for adolescents who self-harm. According to NICE guidelines, 3 to 12 sessions should be offered to people who self-harm (National Institute for Health Care Excellence, 2011). Further research on the effects of gender differences and number of training sessions on patients' responses and treatment engagement is needed.

In considering the results of this meta-analysis, several limitations merit note. First, insufficient good-quality, independently replicated RCTs have been conducted to draw firm conclusions about the effectiveness of specific SPTs for engagement in adolescents with self-harm. Small number of RCTs with small number of participants precluded subgroup analyses. There may be underlying differences between the SPT

provided by the research team and the TAU delivered in another clinical setting. The research team may have greater motivation than other health professionals in another clinical setting to keep the young people engaged in treatment. Furthermore, therapists from the research team and clinical setting may have very different training and supervision, as the research clinical staff is typically specifically trained for the treatment and under more rigorous supervision, particularly as that clinical staff rarely have much supervision time with their high caseload. These differences could be minimized by providing some training sessions for the clinical staff (Asarnow et al., 2011). Having the research team directly providing the TAU would also be a great way to address these limitations (Chanen et al., 2008).

Regardless of the treatment delivery methods, the results were significant across all but one study. In addition, there were significant differences between the SPTs included in the meta-analysis. There were three different RCTs implementing developmental group therapy to adolescents and significant effect on treatment engagement was seen across those studies (Wood et al., 2001; Hazell et al., 2009; Green et al., 2011). Chanen and colleagues utilized individual therapy without incorporating any parental involvement or group therapy elements (Chanen et al., 2008). In most of the studies, parents were either invited or required to participate in at least a portion of the therapy. Family involvement may influence treatment engagement especially in

younger adolescents (Harrington et al., 1998; Spirito et al., 2002; Diamond et al., 2010; Asarnow et al., 2011; Esposito-Smythers et al., 2011; Ougrin et al., 2011; Mehlum et al., 2014). Moreover, previous research has shown that self-harm is often precipitated by family relationship conflicts, which may indicate the importance of involving parents to encourage better communication and resolve any presenting conflicts (Wagner, 1997; Brent et al., 2009). Home-based intervention showed a large positive effect. Although not easily implemented, home visits may be incorporated into a treatment package to enhance engagement (Harrington et al., 1998). Although parental involvement and home visits may be important, not enough replicated RCTs are available to draw firm conclusions about the role of specific components of SPT in maximizing treatment engagement. Furthermore, modern technology has become a dominant gateway of communication, especially in adolescents. Under appropriate designs and consideration, technology-based therapy with the use of internet, social media, and mobile devices may still incorporate elements of traditional therapy such as allowing for family involvement (Cox and Hetrick, 2017). Such therapy may be more appealing to adolescents and could perhaps enhance their engagement. Internet-based raining in psychological therapies also offers promise (Rakovshik et al., 2013, 2016).

The age range of most of the studies was between 12 and 18 years old, with only one study including adolescents as young as 10 years old. Although self-harm is most common in adolescents and young adults, first self-harm episode is reported by the age of 12 years in a third of patients with borderline personality disorder (Zanarini et al., 2006). It may therefore be particularly important to include younger participants in the future studies.

Studies with interventions that did not require young people to attend treatment sessions were excluded in this meta-analysis. In our search, this has excluded the studies where the participants were the parents, instead of the young people themselves, in order to measure treatment engagement of young people directly. There is emerging evidence that electronic therapy without face-to-face element may have some benefits on young people. We did not identify any RCTs that investigated the effects of electronic therapy on self-harm. Furthermore, patients seldom have the choice of receiving the treatment of their choice and it may impede the likelihood of sustained engagement. While it is impossible to allow for actual choices in RCTs, it is somewhat equally difficult to provide treatment choices clinically as it is often limited by resources and of best inters to the patients. However, arrangement over the mode and delivery of treatment may be plausible. An investigation on the preference over various means of treatment may identify crucial indication of specific elements in treatment for self-harming adolescents. Future research could aim on incorporating elements of electronic therapy into traditional face-to-face therapy in order to investigate its effect on treatment engagement, as the electronic therapy could potentially be a bridge in between the traditional therapy sessions.
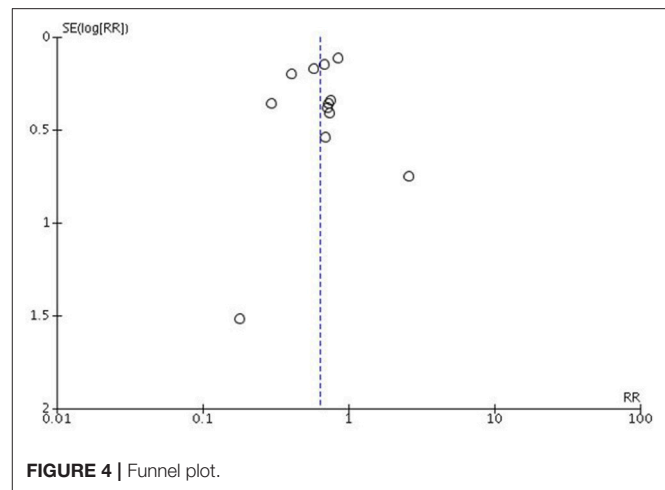

FIGURE 4 | Funnel plot.

Treatment engagement was defined as attending four or more sessions in this meta-analysis. This cut-off has been used in a lot of research studies (Spirito et al., 1992; Wood et al., 2001). Alternative cut-off points were considered, including the total number of sessions and attending at least one follow-up session. The former provides a good overall picture of treatment engagement, but it could be prejudicial for those who do not attend many sessions due to the resolution of their symptoms or for those who do not feel they benefit from the treatment. The latter is an easily replicable and available measurement, but it does not acknowledge the dose-response relationship. Adolescents may not be required to attend treatment sessions in some clinical settings nowadays, however their treatment engagement remains questionable under such circumstances. Future studies could look at alternative ways of measuring treatment engagement.

Although all SPTs were compared against routine care, some studies enhanced or designed a specific TAU, which may be significantly different than usual routine care (Donaldson et al., 2005; Esposito-Smythers et al., 2011). As more RCTs become available in the future, more subgroup analyses could be performed to see whether such differences in the TAU arm have an influence on the effect. All studies had primary outcome measuring something other than engagement, except for two studies (Spirito et al., 2002; Ougrin et al., 2011), which implies significant heterogeneity in study design. In addition, there were significant differences in self-harm definitions used by different studies, which further complicate interpretation of the results. This is due to a lack of consensus in the definition of self-harm. Recently, non-suicidal self-injury (NSSI) has become more prevalent and was proposed in DSM-5 that it should become a distinct diagnostic category (American Psychiatric Association, 2013). A lot of young people have NSSI as their main problem but are not currently diagnosed with such. Hence, there are often discrepancies and difficulties when psychotherapies are being delivered. The proposed DSM-5 diagnostic criteria for an NSSI disorder include a criterion that the behavior causes the person impairment or distress and there is a discussion on whether this criterion should be part of each diagnosis. It has been found that

adolescents with NSSI without impairment or distress did not fulfill criteria for borderline personality disorder and had less externalizing disorders (In-Albon et al., 2013). Future research on treatment engagement and effectiveness could also look at differences between such populations of young people. As we move to a better consensus in the definition of self-harm, SPT for self-harm could be better researched, designed and implemented.

CONCLUSION

Treatment engagement is crucial in psychological therapy. Engaging adolescents with psychological treatment is necessary although not sufficient to achieve treatment goals Specific psychological treatments should be offered to adolescents with self-harm to maximize treatment engagement. More research is required to delineate specific characteristics of SPT linked with better engagement. Greater international consensus regarding definition of self-harm should facilitate research in this field.

AUTHOR CONTRIBUTIONS

SY is responsible as the corresponding author. She completed literature search and was primarily responsible for writing the content of this article. KK completed literature search and rating of each articles. He attended all consensus meetings. He helped to review and edit the article. DO provides approval for publication of the content. He supervised and led SY and KK throughout the process of writing this article. He helped to review and edit the article.

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Effectiveness of Psychotherapy on Suicidal Risk: A Systematic Review of Observational Studies

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Background: Suicidal behavior is a major public health concern worldwide, and the interest in the development of novel and more efficient treatment strategies and therapies to reduce suicidal risk is increasing. Some recent studies have summarized the results of randomized clinical trials (RCTs) assessing the efficacy of psychotherapeutic tools designed to treat patients at suicidal risk. However, observational studies, which reflect real-world effectiveness and may use original approaches, have not been reviewed.

Method: The aim of this study is to systematically review the available scientific evidence issued from observational studies on the clinical effectiveness of psychotherapeutic tools designed to treat patients at suicide risk. We have thus performed a systematic search of PubMed and Web of Science databases.

Results: Out of 1578 papers, 40 original observational studies fulfilled our selection criteria. The most used psychotherapeutic treatments were dialectical behavioral therapy (DBT, 27.5%) and cognitive behavioral therapy (CBT, 15.0%) in patients with a diagnosis of borderline personality disorder (32.5%) and depression (15.0%). Despite the between-study heterogeneity, interventions lead to a reduction in suicidal outcomes, i.e., suicidal ideation (55.0%) and suicide attempts (37.5%). The content and reporting quality varied considerably between the studies.

Conclusion: DBT and CBT are the most widely used psychotherapeutic interventions and show promising results in existing observational studies. Some of the included studies provide innovative approaches. Group therapies and internet-based therapies, which are cost-effective methods, are promising treatments and would need further study.

Keywords: effectiveness, psychotherapy, suicide attempt (SA), suicidal ideation (SI), systematic review

INTRODUCTION

Suicide is a global public health problem causing about one million deaths every year according to the World Health Organization (World Health Organization, 2018). Although the most relevant risk and protective factors associated with suicidal behavior have been identified (**Table 1**), the global suicide rates have remained relatively stable in the last years.

One essential drawback for reducing suicide and suicide attempts is the lack of clear evidence on interventional programs directed to the population at risk (e.g., patient with suicide attempt history). Besides, knowledge about the efficacy of existing interventions is limited by the paucity of randomized clinical trials (RCTs) (Miller et al., 2017). Some interventions have shown to be efficacious, but the integration and dissemination of these programs in common clinical practice has proven to be an arduous task (Comtois and Linehan, 2006). The role of psychotherapy in suicide prevention is recognized but insufficient (Schneider, 2012). Current evidence supports especially the efficacy of Cognitive Behavioral Therapy (CBT) or Dialectical Behavioral Therapy (DBT), with a particular interest of problem-solving strategies (McMain et al., 2009; Rudge et al., 2017; Weinstein et al., 2017; Calati et al., 2018). Intensive outpatient support therapy, even if unspecific, is also a mainstay of suicide prevention guidelines (Mann et al., 2005; Zalsman et al., 2016). However, the evidence supporting these therapies and how to apply them is still scarce. Further research is needed to sustain existing results and design treatment plans contributing to a better treatment approach for the suicidal patient in different contexts, such as emergency room, primary care or inpatient units (Comtois and Linehan, 2006).

The creation of evidence-based guidelines for psychotherapy in suicide prevention is needed to improve the outcomes, especially in vulnerable groups presenting major social, psychiatric, or psychological risk factors (Valtonen et al., 2006; Rihmer, 2007; Fountoulakis et al., 2009; Rogers et al., 2018). Ideally, intervention strategies could follow a consensual methodology to ensure the coherence and comparability of results.

The aim of the current study is: (1) to systematically review observational studies exploring the effect of psychotherapeutic programs in the prevention of suicidal behaviors, (2) to describe the quality of this literature, (3) to identify innovative approaches, and (4) to propose recommendations for future observational research in this area. We planned to include only observational studies in order to assess literature that is not covered by recently published systematic reviews and meta-analyses (Sledge et al., 2014; Calati and Courtet, 2016; Hawton et al., 2016; Meerwijk et al., 2016; Krysinska et al., 2017; Leavey and Hawkins, 2017; Calati et al., 2018). Observational studies may help to assess the effectiveness of a psychotherapeutic strategy (Nallamothu et al., 2008), while RCTs are not necessarily representative of real-world situations because of their detailed inclusion and exclusion criteria (Faraoni and Schaefer, 2016). Thus, results from both RCTs (efficacy) and observational studies (effectiveness) provide valid evidence to improve clinical practice (Shadish et al., 2000; Berger et al., 2012).

MATERIALS AND METHODS

Search Strategy

A systematic review was performed to identify the available published data on psychotherapeutic strategies addressing suicidal behavior. A broad free text search was made using the terms (psychotherap* OR psychosoc* OR psychologic* OR acceptance and commitment therapy OR cognitive behavior* therapy OR cognitive therapy OR dialectical behavior therapy OR dialectical behavior therapy OR interpersonal psychotherapy OR mentalization based treatment OR mindfulness OR problem solving therapy OR schema-focused therapy OR transference-focused psychotherapy) AND (effectiveness OR efficac*) AND (suicid*) for PubMed and Web of Science. Potentially relevant papers in all languages until March 2018 were accessed to review full texts. Additional articles were obtained through citation tracking of reviews/opinion articles and original papers. The titles, abstracts, and studies identified in the literature search were assessed by two reviewers (PMB and FRR). All studies matching the inclusion criteria were reviewed by the authors and disagreements were settled through discussion.

Inclusion Criteria, Exposures, and Outcomes

In this review we included only observational studies in populations presenting suicidal ideation, suicide plans, or suicide attempts and informing about the effect of a psychotherapeutic approach, either individual or group therapy, in terms of

TABLE 1 | Risk and protective factors associated with suicidal behavior.

Risk factors	Protective factors
INDIVIDUAL-LEVEL	
Prior suicide attempt(s)	Problem-solving skills
Mental disorders (Axis II diagnosis)	Frustration tolerance
Trauma or abuse history	Self-control
Hopelessness	Reasons for living and optimism
Stressful life events	Perceptions of positive health
Self-harm	Participation in sporting activities
Prior psychiatric hospitalization	–
Family history of suicide	–
Chronic illness and pain	–
Personality traits	–
Biomedical/physical determinants	–
SOCIAL-LEVEL	
Job or financial loss	Family relationships
Socio-economic disadvantage	Partnership
Relationship conflict, discord or loss	Social relationships and social support
Disaster, war and conflict	Religious or spiritual beliefs
Acculturation stress	Employment

(McLean et al., 2008); (Ougrin et al., 2015); (World Health Organization, 2014).

FIGURE 1 | PRISMA flow diagram summarizing the systematic literature review and its results.
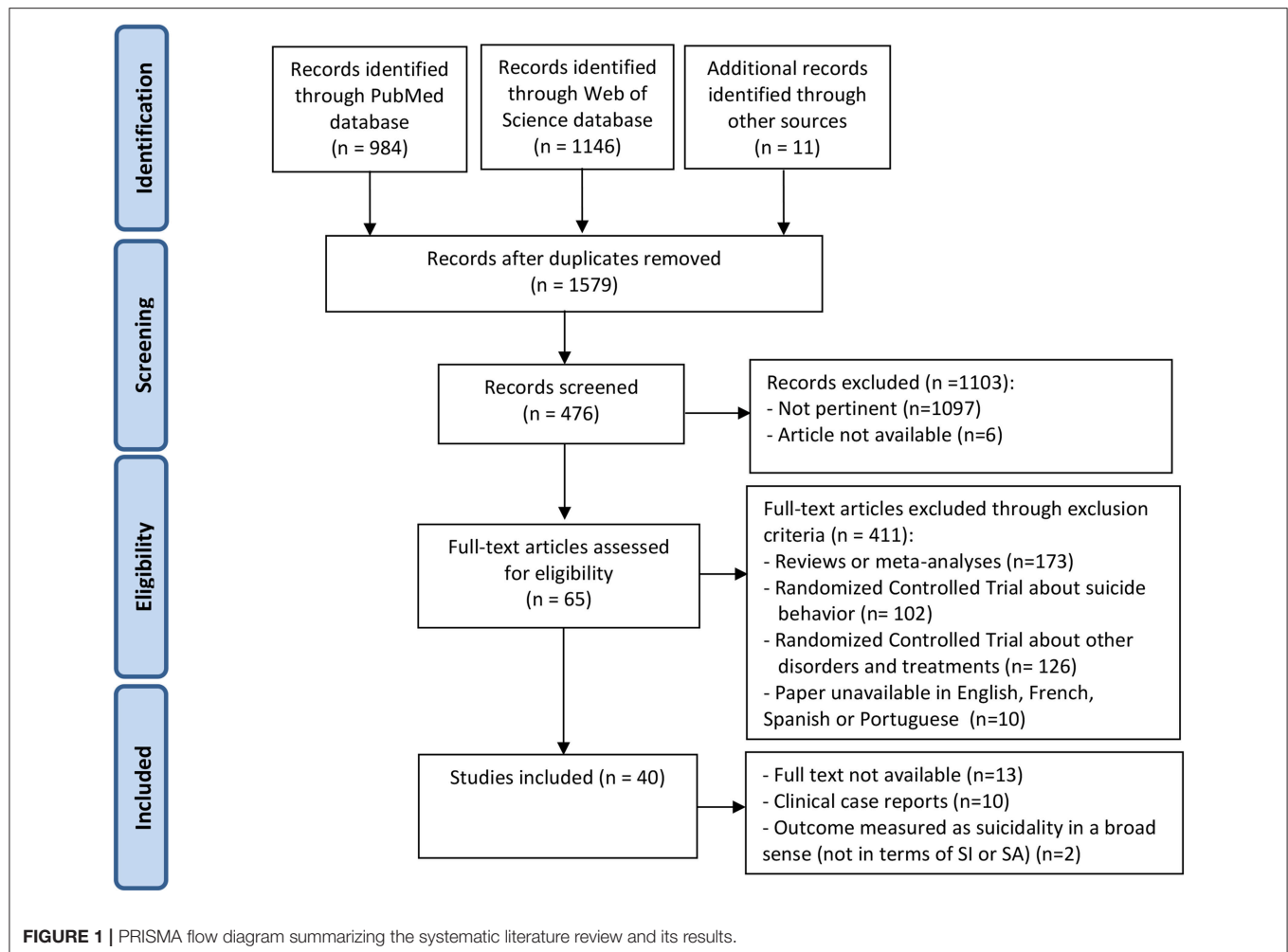
suicidal outcomes. Concerning suicidal outcomes we referred to established nomenclature (Turecki and Brent, 2015). In particular, suicidal ideation refers to thoughts about taking action to end one's life, while suicide attempt is a self-inflicted potentially injurious behaviour with a non-fatal outcome and with the intention to die (De Leo et al., 2006). Only papers in English, French, Spanish or Portuguese were included. A flow diagram summarizing the selection process can be found in **Figure 1**.

Exclusion Criteria
All articles that focused on deliberate self-harm or non-suicidal self-injury, as opposed to suicidal behavior, were excluded. Systematic reviews, meta-analyses, randomized controlled trials and reports of clinical case studies were also excluded.

Data Extraction and Quality Assessment
One independent reviewer (FRR) supervised by a senior reviewer (PMB) extracted the relevant data using a predesigned data extraction form. Disagreement between the two reviewers was solved by referring to two additional reviewers (JLC and RC). From each selected original observational study, the following data was extracted: sample size, gender, mean age, psychiatric diagnoses, psychotherapeutic strategy, duration, number of

weekly sessions, follow up after therapy, assessment scales, main results, and methodological quality rating.

We assessed the methodological quality of papers using the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies created by the US National Heart, Lung, and Blood Institute (NHLBI) (NIH, 2018). This tool measures 14 different criteria which are then used to give each study an overall quality rating which is classified in good, fair, or poor. Two authors (PMB and FRR) applied this tool, they independently evaluated the items as "yes," "no," "not applicable," "cannot determine" or "not reported." This method was used to guide the quality rating of each study. In case of disagreement, consensus was reached through discussion. Based on previous articles (Koppen et al., 2016; Carbia et al., 2018) and our own assessment, we used the following threshold scores for the classification of the studies: good (>11), fair (6–9) and poor (<6).

RESULTS

Description of the Studies
A total of 40 papers were identified as meeting the inclusion criteria (**Figure 1**). A detailed description of the studies can be

found in **Tables 2**, **3**. Studies focused on suicidal ideation ($n = 23$, 57.5%) or suicide attempts ($n = 17$, 42.5%) in adult or adolescent samples. A large majority reported a decrease either in suicidal ideation (22/23) or suicide attempts (15/17).

The most frequently reported interventions consisted on DBT or CBT. The remaining interventions used strategies based on miscellaneous approaches such as interpersonal psychotherapy, psychodynamic oriented therapy and family therapy.

The studies focused on patients with the following mental disorders: borderline personality disorder ($n = 13$, 32.5%), depression ($n = 6$, 15%), mood disorders ($n = 4$, 10%), and personality disorders ($n = 3$, 7.5%). Only the study by Ducasse et al. (2014) considered suicidal behavior disorder, the diagnostic category proposed in DSM-5 (American Psychiatric Association, 2013).

Psychotherapies were heterogeneous in terms of their intensity (duration of intervention, number of sessions). The duration varied between 1 and 2 weeks ($n = 3$, 7.5%), 2–3 months ($n = 8$, 20%), 4–8 months ($n = 11$, 27.5%), 12–18 months ($n = 10$, 25%), and one that extended over a period of 36 months (2.5%). Three studies (7.5%) did not report the duration. Most interventions planned one ($n = 16$, 40%) or two sessions per week ($n = 10$, 25%). Follow-up after therapy was reported in 57.5% of the studies. Follow-up length varied from 1 month ($n = 1$, 2.5%), 3–6 months ($n = 12$, 30%), 10–18 months ($n = 8$, 20%) and 2–3 years ($n = 2$, 5%). Many studies compared only assessments before and after therapy ($n = 17$, 42.5%).

Studies Focused on Suicide Ideation

Twenty-three studies were assessed. Results were positive overall, with a decrease of suicidal ideation rates in 95.7% of them. The most used psychotherapeutic treatments were DBT ($n = 7$, 30.4%) and CBT ($n = 4$, 17.4%). Interventions generally followed a weekly pattern ($n = 12$, 52.2%).

Two naturalistic interventions were focused on internet-based CBT to address suicidal ideation in depressed patients recruited by their primary care physician (Watts et al., 2012; Mewton and Andrews, 2015). The brief intervention consisted in six online sessions but the reported positive results, with a decrease in both suicidal ideation and depression levels from baseline, suggest the utility of this method in terms of cost and accessibility for the patients. Perepletchikova et al. (2011) applied an intensive version of DBT (2 weekly sessions during 6 weeks) to 11 children presenting mood symptoms and obtained good results: suicidal ideation and depressive symptoms decreased, while coping strategies improved. Heisel et al. (2015) performed a pilot study including 16 sessions of weekly interpersonal therapy for older adults. Compared to baseline assessments, suicidal ideation was lower at the end of the treatment and 6 months later. Petrakis and Joubert (2013) applied a brief assertive psychotherapy by social workers to 57 patients attending the emergency department. Patients, independently of their diagnosis, received a comprehensive evaluation, and linkage to community services was proactively encouraged to minimize drop-outs. In this program, psychosocial improvements were associated with a reduction in the level

of depression and suicidal ideation, but the specifics of the therapy are not described. Another study by Högberg and Hällström (2008) used the active multimodal psychotherapy, an integrative approach combining different psychotherapeutic techniques in a case series of 14 suicidal adolescents. The approach comprised mood charting, psycho-education, well-being practice and trauma resolution (including eye movement desensitization and reprocessing).

Of note, two studies used exclusively group interventions and four combined both individual and group interventions. A very complete Irish program delivered individual and group DBT weekly sessions, as well as phone coaching and follow-up visits, for borderline personality disorder patients during 12 months (Flynn et al., 2017). Gutteling et al. (2012) also found that group DBT could be used to reduce suicidal ideation and depressive symptoms in borderline personality disorder. In general, group interventions were effective in reducing suicidal ideation and improving several other outcomes related to mental health.

Studies Focused on Suicide Attempts

Seventeen studies examined the effect of interventions in reducing subsequent suicide attempts. Most of them provided positive results ($n = 15$, 88.2%), frequently using DBT methods ($n = 4$, 23.5%) and weekly sessions ($n = 8$, 47.0%).

The Collaborative Assessment and Management of Suicidality (CAMS) was compared to treatment as usual (TAU) in a small sample of suicidal outpatients (Jobes et al., 2005). A reduction in suicidality (including any suicidal behavior or suicidal thought) was found in both groups at the end of treatment but CAMS achieved similar results in a significantly lower number of sessions. Interestingly, CAMS was also associated with decreased medical health care utilization 6 months after the treatment.

Some psychosocial programs combined social interventions and psychoanalytic therapy (individual and group-focused) to improve the social functioning of patients with personality disorders. These programs included a step-down period of limited duration offering biweekly therapy in small groups, meetings with community nurses and psychiatric consultations. Participants were also encouraged to create social bounds in the community, which was considered by the authors as particularly useful in reducing the risk of suicide attempts (Chiesa and Fonagy, 2003; Chiesa et al., 2004).

Another program, named Systems Training for Emotional Predictability and Problem Solving (STEPPS) and combining CBT elements and skills training with a systems component, was found to reduce suicide attempts in personality disorders patients (Alesiani et al., 2014; Boccalon et al., 2017). STEPPS was also associated with better emotional regulation, fewer hospitalizations and suicide attempts 6 months after the end of the treatment (Boccalon et al., 2017). Finally, the delivery of a manualized problem-solving and comprehensive contact intervention (PS-CCI) to mood-disordered patients found a decrease in both suicidal ideation and suicide attempts 3 months later (Alonzo, 2016). The intervention was delivered in emergency settings and included an educative interview about problem-solving, the sending of a personalized postcard and a telephone call 3 months later.

TABLE 2 | Description of studies reporting the effects of psychotherapy on suicide ideation.

Study	Sample size	Gender: (females: N, %)	Mean age	Psychiatric diagnoses	Psychotherapeutic strategy	Duration	Number of weekly sessions	Follow up after therapy	Assessment scales	Mains results (compared to baseline or other intervention)	NIH NHLBI quality rating
Najavits et al., 1998	17	17, 100	35.9	PTSD/SD	CBT	3 months	Two	3 months	SBQ	Reduction of SI	Fair
Low et al., 2001	10	10, 100	28.7	BPD	DBT	12 months	One	6 months	BSSI	Reduction of SI	Poor
Katz et al., 2004	62	52, 83.8	15.4	NR	DBT v/s TAU	2 weeks (DBT)	Two	12 months	SIQ	Reductions of SI (both treatments)	Fair
Stanley et al., 2007	20	17, 85	32.2	BPD	DBT	6 months	NR	3 and 6 months	Self-report measures	Reduction of SI	Fair
Högberg and Hällström, 2008	14	11, 78.6	14.7	NR	Active multimodal psychotherapy	NR	Every 2 weeks	22 months	GAF	Reduction of SI	Fair
Miklowitz et al., 2009	22	NR	40.6	BD	MBCT	2 months	NR	NR	BSSI	Reduction of SI	Fair
Perepletchikova et al., 2011	11	6, 55	9.83	Depression Anxiety	DBT	1.5 months	Two	NR	MFQ	Reduction of SI	Poor
Diamond et al., 2012	10	8, 80	15.10	NR	ABFT	3 months	One	NR	SIQ	Reduction of SI	Fair
Ellis et al., 2012	20	16, 80	36.9	MD	CAMS Program	51 days	Two	NR	BSSI	Reduction of SI	Poor
Gutteling et al., 2012	34	34, 100	32.65	BPD	DBT Group Therapy	12 months	One (2 h)	NR	BDI and Dutch version of the SCL-90-R	Reduction of SI	Poor
Watts et al., 2012	299	166, 56	43	MDD	ICBT	1 week	Six online lessons	NR	PHQ-9	Reduction of SI	Fair
King et al., 2013	2070	1227, 63	33.2	D	Suicide prevention intervention (CBT-based).	2 months	Unlimited sessions (45–60 min. each session)	NR	MSSI	Reduction of SI	Poor
Petrakis and Joubert, 2013	65	26, 40	17 to 78	D	Assertive Brief Psychotherapy and Community Linkage	6 months	NR	6 months	BDI-II	Reduction of SI	Fair
Ward-Ciesielski, 2013	18	10, 56	40.19	NR	DBT	NR	One-time	1 month	SSI	Reduction of SI	Fair
Ducasse et al., 2014	35	15, 42.9	38.4	SBD	ACT	seven sessions	One	3 months	C-SSRS SSI score	Reduction of SI	Fair
Serpa et al., 2014	79	9, 11	60	NR	MBSR	2 months	One (2-h sessions)	NR	PHQ-9	Reduction of SI	Fair
Heisel et al., 2015	17	9, 53	70.1	MD	IPT	4 months	One (50–60 min. sessions for 16 weeks)	3 and 6 months	GSIS	Reduction of SI	Fair
Mewton and Andrews, 2015	484	232, 60.3	41.9	D	ICBT	1 week	Six online sessions	NR	PHQ-9	Reduction of SI	Poor
Rodzinski et al., 2015	680	473, 70	30.1	NB/PD	Intensive integrative psychotherapy with predominance of the psychodynamic approach	3 months	One session (individual) 10–15 sessions (group psychotherapy)	NR	Symptom Checklist KO"O"	Reduction of SI	Fair
Walser et al., 2015	981 Veterans	222, 22.6	50.5	D	ACT-D	12 months	One per month (total: 12–16 sessions)	NR	BDI-II	Reduction of SI	Fair

(Continued)

TABLE 2 | Continued

Study	Sample size	Gender: (females: N, %)	Mean age	Psychiatric diagnoses	Psychotherapeutic strategy	Duration	Number of weekly sessions	Follow up after therapy	Assessment scales	Mains results (compared to baseline or other intervention)	NIH NHLBI quality rating
Teismann et al., 2016	105	70, 66.7	37.4	AD	Exposure-based treatment	Unlimited	30 sessions in total	NR	DSI-SS	No effects on SI	Fair
Weinstock et al., 2016	12	6, 50	47.3	BD	Adjunctive behavioral activation (BA)	5 months	One (16 sessions)	NR	MSSI	Reduction of SI	Fair
Flynn et al., 2017	71	61, 86	40	BPD	DBT	12 months	Two (individual and group therapy)	12 months	BSSI	Reduction of SI	Fair

ABFT, Attachment-Based Family Therapy; ACT, Acceptance and Commitment Therapy; ACT-D, Acceptance and Commitment Therapy for Depression; AD, Anxiety Disorder; BD, Bipolar Depression; BDI, Beck Depression Inventory; BPD, Borderline Personality Disorder; BSSI, Beck Scale for Suicide Ideation; CAMS, Collaborative Assessment and Management of Suicidality; CBT, Cognitive Behavioral Therapy; C-SSRS, Columbia-Suicide Severity Rating Scale; D, Depression; DBT, Dialectical Behavior Therapy; DSI-SS, Depressive Symptom Inventory Suicidality Subscale; GAF, Global Assessment of Functioning; GSIS, Geriatric Suicide Ideation Scale; ICBT, Internet Cognitive Behavior Therapy; IPT, Interpersonal Psychotherapy; MBSR, Mindfulness-Based Stress Reduction; MBCT, Mindfulness-Based Cognitive Therapy; MD, Mood Disorder; MDD, Major Depressive Disorder; MFQ, Mood and Feeling Questionnaire; MSSI, Modified Scale for SI; NB, Neurotic Behavioral; NR, Not Reported; PD, Personality Disorders; PHQ-9, Patient Health Questionnaire; PTSD, Post-Traumatic Stress Disorder; SBQ, Suicidal Behaviors Questionnaire; SBD, Suicidal Behavior Disorder; SCL-90-R, Symptom Checklist 90–Revised; SD, Substance Dependence; SI, suicidal ideation; SIQ, Reynolds' SI Questionnaire-Jr.; SSI, Scale for SI; TAU, Treatment As Usual.

Quality Assessment

The large majority of the studies (*n*=26) was qualified as "fair" at the quality assessment. Only one was scored "good" while 13 studies were considered "poor." The most common caveats were the lack of sample size justification, not describing precisely the features of participants, showing weaknesses in the statistical methodology and making only pre- and post-test evaluations (with no further assessment).

DISCUSSION

Clinical decision-making regarding patients with suicidal risk is largely based on the experience of health care providers, rather than international guidelines. Suicidal patients are heterogeneous, and frequently non-adherent to treatment or follow-up. Since this variability is unlikely to be reflected in RCTs, we have tried to synthesize data from observational studies to complete the results of previous reviews and meta-analyses. The results seem to confirm the effectiveness of psychotherapeutic interventions for the management and reduction of suicidal risk. However, there is a lack of methodological consensus on how to apply these interventions, which limits the generalizability of the findings. In this domain, many observational studies, similarly to RCTs (Witt et al., 2018), do not offer detailed information about the components of psychotherapeutic interventions, such as the number of sessions, their frequency, the duration of follow-up, or the clinical features of the sample. Of note, some strategies, such as internet-based therapies, group therapy or community settings for the treatment, might prove particularly cost-effective.

According to our results, CBT and DBT appear to be the most used and effective psychotherapeutic interventions for patients presenting suicidal ideation or suicide attempts, even in the short-term. For instance, 1-week internet-based CBT (Watts et al., 2012; Mewton and Andrews, 2015) and a short 2-month CBT program to reduce suicide risk in primary care patients (King et al., 2013) were both effective in reducing suicidal ideation. Another short-term intervention (seven sessions) addressing suicidal behavior disorder with Acceptance and Commitment Therapy showed a decrease in both the frequency and intensity of suicidal ideation (Ducasse et al., 2014). Of note, no other study focused on the diagnostic category of suicidal behavior disorder, which is associated with the risk of attempting suicide in the short-term. To consider suicidal behavior as a trans-diagnostic entity could help to more accurately evaluate the effect of psychotherapeutic interventions.

However, the range of potential psychotherapeutic interventions for suicide prevention is not limited to CBT and DBT. Mindfulness-based strategies, integrative programs, CAMS, STEPPS, or PS-CCI, just to mention some, are promising possibilities. Besides, most studies were conducted in adults, but some interventions have shown promising results in extreme ages, such as DBT adapted for children (Perepletchikova et al., 2011) and interpersonal therapy for older adults (Heisel et al., 2015).

Luoma et al. (2002) found that ~45% of suicide victims had contact with primary care in the month prior to their death and 77% in the year before suicide. Since so far the evidence sustaining targeted psychotherapeutic interventions for patients at suicide risk is still scarce, a research effort to establish effective interventions is needed. Some interventions need to be tested in independent and larger samples to verify their utility before translation into common clinical practice could be considered (Glenn et al., 2015). Group CBT for the prevention of repeated suicide attempts is currently being compared to individual supportive therapy by our team in a multicenter randomized clinical trial (clinicaltrials.gov registration: NCT02664701). Indeed, the setting of the therapy (individual vs. group) does not appear to predict the outcome for several mental disorders (Pomini, 2004) and the group setting provides important pragmatic advantages, such as a more efficient use of human resources dedicated to patient care and subsequent cost savings.

TABLE 3 | Description of studies reporting the effects of psychotherapy on suicide attempts.

Study	Sample size	Gender: (females: N, %)	Mean age	Psychiatric diagnoses	Psychotherapeutic strategy	Duration	Number of weekly sessions	Follow up after therapy	Assessment scales	Mains results (compared to baseline or other intervention)	NIH NHLBI quality rating
Hengeveld et al., 1996	9	9, 100	31	NR	CBT	2 months	One	10 months	BDI	No effects on repetition of SA	Poor
Clarkin et al., 2001	23	23, 100	32.7	BPD	Transference Focused Psychotherapy	12 months	Two	NR	PHI	Reduction in SA	Poor
Chiesa and Fonagy, 2003	40	31, 77.5	32.2	PD	Psychosocial community-based treatment v/s Long term residential treatment (hospital-based program)	12 months	Two	24 months	Structured interview	Reduction in SA (mainly in Psychosocial community-based treatment)	Fair
Chiesa et al., 2004	143	NR	32.8	PD	Psychoanalytically oriented residential specialist program v/s Phased "step-down" specialist psychosocial program v/s General community psychiatric model	12 months	Two	12 months	Structured interview	Reduction in SA (only in the step-down condition of specialist psychosocial program)	Fair
Jobes et al., 2005	55	19, 34	29.1	MD	CAMS v/s TAU	CAMS 7 sessions TAU 12 sessions	One	6 months	SSF	Reductions in SA (both treatments)	Poor
Hulbert and Thomas, 2007	27	27, 100	34	BPD	STP	6 months	NR	12 months	PHI	Reduction in SA	Poor
Petersen et al., 2008	66	56, 84.4	27.4	PD	Specialized short-term psychotherapeutic day treatment program v/s TAU	5 months	Three	6 months	Patients' self-reported suicidal acts	Reduction in SA (Specialized short-term psychotherapeutic day treatment program)	Fair
Stanley et al., 2009	110	84, 75.5	15.8	NR	Manualized cognitive behavioral treatment	6 months	One	NR	NR	Insufficient evidence	Poor
Fleischhaker et al., 2011	12	12, 100	13 to 19	BPD	DBT-A	4–6 months	NR	12 months	LPC	Reductions in SA	Poor
Andion et al., 2012	51	51, 100	25.63	BPD	Combined individual/group DBT v/s Individual DBT	12 months	One	18 months	Number of SA	Reduction in SA (both treatments)	Fair
Bales et al., 2012	45	32, 71.1	30.1	BPD	Manualized day hospital MBT	18 months	One	NR	SSHI	Reduction in SA	Fair
Alesiani et al., 2014	32	26, 81	44.41	BPD/PD	STEPPS Program	6–8 months	Two	12 months	Number of SA	Reduction in SA	Fair
Stiglmayr et al., 2014	47	43, 91.5	30.1	BPD	DBT	12 months	Two (individual and group therapy)	4 months	LPC	Reduction in SA	Fair
Fischer and Peterson, 2015	10	10, 100	16.20	BN	DBT	6 months	One or less (total: seven sessions)	6 months	BDI-II and Diary cards	Reduction in SA	Good
Kvarstein et al., 2015	64 (MBT) 281 (Ps. T.)	54, 84 (MBT) 233, 83 (Ps. T.)	26 (MBT) 30 (Ps. T.)	BPD	MBT v/s Psychodynamic treatment program	36 months	One (dynamic therapy group)	NR	Self-report questionnaire	Reduction in SA (MBT more effective)	Fair
Alonzo, 2016	22	11, 50	33.45	MD	PS–CCI	NR	3 months	3 months	NR	Reduction in SA	Poor
Boccalon et al., 2017	24	20, 83	41.0	BPD/PD	STEPPS program	5 months	One	6 months	Clinical interview	Reduction in SA	Fair

BDI, Beck Depression Inventory; BN, Bulimia Nervosa; BPD, Borderline Personality Disorder; CAMS, Collaborative Assessment and Management of Suicidality; CBT, Cognitive Behavioral Therapy; DBT, Dialectical Behavior Therapy; DBT-A, Dialectical Behavioral Therapy for Adolescents; LPC, Lifetime Parasuicide Count; MBT, Mentalization-Based Treatment; MD, Mood Disorder; NR, Not Reported; PD, Personality Disorders; PHI, Parasuicidal History Interview; PHI, Parasuicide Harm Inventory; PS–CCI, Problem Solving, Comprehensive Contact Intervention; SA, suicide attempt; SSF, Suicide Status Form; SSHI, Suicide and Self Harm Inventory; STEPPS, Systems Training for Emotional Predictability and Problem Solving; STP, Spectrum group Treatment Programme; TAU, Treatment As Usual.

According to the quality assessment, reviewed studies present frequent weaknesses at the methodological level. These deficits comprise mainly a restricted evaluation of the sample, a vague description of the intervention, the non-justification of the sample size, the lack of a blinded outcome assessment, and a limited time frame to examine the association between exposure and outcome. In addition, adjustment for relevant confounders, such as educational level, depression severity, or the concomitant use of psychotropic treatment, was not considered in the majority of the studies. A reassessment several weeks or months after the end of the psychotherapy is also needed to ascertain the duration of the effect. Importantly, the cost-effectiveness of psychotherapeutic programs, such as short programs and group psychotherapy, could be compared to pharmacological approaches or non-specific support therapy. Our review uncovers a high heterogeneity in type and intensity of psychotherapeutic programs to reduce suicidal behavior. A quite wide range of psychotherapeutic strategies may be efficacious to prevent suicidal behavior but the benefits of their application in real clinical conditions (effectiveness) is not yet clear. We also need to differentiate the specific effect of psychotherapy from the non-specific effect of any treatment implying intensive contact and follow-up with a physician, such as supportive therapy provided by a general practitioner. Stronger evidence regarding the specific aspects of psychotherapy that reduce the suicide risk is thus needed.

Both RCTs and observational studies provide relevant information for the interpretation of the efficacy and effectiveness of therapeutic strategies applied to different populations. Future observational studies in this area should provide precise measurements of the exposure, as well as a detailed description of the components of psychotherapeutic interventions and the outcome variables of interest. Additional recommendations include a consensual terminology, notifying patients of the potential risks of therapies during the informed consent process, and clear procedures for monitoring and reporting side effects (Guidi et al., 2018; Rozental et al., 2018).

In summary, further research is still needed to discern how to improve psychotherapeutic strategies in suicide prevention. Replication by independent groups of successful programs is particularly important to ensure generalizability of the findings (Miklowitz and Taylor, 2006; Glenn et al., 2015; Zalsman et al., 2016). Psychotherapeutic interventions seem to have a positive effect in patients with suicidal ideation and suicide attempts, but it is not yet possible to identify the most effective/efficacious psychotherapeutic approach. This is partly due to the very high number of interconnected factors that should be assessed, i.e., patient-clinician-treatment related factors. Artificial intelligence could be one further promising tool to answer to this complex question.

AUTHOR CONTRIBUTIONS

PM-B, JL-C, and RC conceived and designed the study and drafted the manuscript. PM-B and FR-R managed the literature searches and analyses. All authors revised the article critically and read and approved the final manuscript.

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