



## Review article

## Theoretical frameworks informing the relationship between parental death and suicidal behaviour: A scoping review

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## ABSTRACT

**Background:** Exposure to parental death in childhood has been strongly associated with offspring suicide although few studies have applied theoretical models to conceptualise this relationship.**Methods:** Using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses – Scoping Reviews guidelines, we conducted a scoping review of primary studies that identified a theory/framework explaining the aetiology of suicidal behaviour in adulthood, following childhood exposure to external-cause parental death, including suicide.**Results:** The search yielded 1598 articles. Following full-text screening, 23 studies were identified as meeting inclusion criteria. Data extraction was then completed and found that the studies collectively referenced nine theories. The specific theories identified covered a range of biopsychosocial frameworks and included attachment theory, familial transmission of suicide, conservation of resources framework, diathesis-stress model, social integration theory, socio-ecological model, social learning theory, critical period hypothesis or life course approach and the developmental model of antisocial behaviour.**Limitations:** It was beyond the scope of this review to conduct rigorous testing and evaluation of the theories identified. Future research could extend on this study by developing criteria to assess the range of theories and frameworks on suicide exposure, as well as the studies providing evidence for these theories, in order to guide more advanced theory development as well as policies, programs and interventions.**Conclusions:** Based on these theories, the authors proposed that using an integrated biopsychosocial model will provide a more comprehensive understanding of the diverse risk and protective factors for suicidal behaviour following parental death.

## 1. Introduction

Suicide is a global public health problem with approximately 800 thousand deaths per year worldwide (World Health Organisation, 2018). A large body of research has focused on identifying precursors of suicidal behaviour although less is known about early life factors that may increase the likelihood of suicide in adulthood. Such factors typically include traumatic or adverse childhood events (ACEs) such as abuse, exposure to domestic violence, neglect, parental criminality and parental loss (Agerbo, Nordentoft and Mortensen, 2002b; Gravseth et al., 2010; Serafini et al., 2015).

Several studies have examined clusters of adverse life events that may be associated with suicidal behaviour, although few have focused on a

single life event and suicide risk among adults (Serafini et al., 2015; Thompson et al., 2012). Exposure to parental loss in childhood, specifically death has frequently been identified as a risk factor for subsequent suicidal behaviour in adulthood (Agerbo et al., 2002b; Cheng et al., 2014; Gravseth et al., 2009; Guldin et al., 2015; Jakobsen and Christiansen, 2011; Jeon et al., 2013; Kuramoto et al., 2010; Mittendorfer-Rutz et al., 2012; Niederkrotenthaler, Floderus, Alexanderson, Rasmussen and Mittendorfer-Rutz, 2012; Wilcox et al., 2010). It has also been shown that parental death from external causes, including suicide, homicide and unintentional injury, are linked with a greater suicide risk compared with parental death from natural causes. This is attributed to the often sudden, unexpected, violent, traumatic nature of the death and maladaptive grief

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processes for bereaved offspring (Agerbo, Nordentoft and Mortensen, 2002a; Bowlby, 1982).

Empirical studies that have examined parental death as an independent risk factor for suicide are limited. Existing findings show that parental suicide in particular is a significant risk factor for future suicidal behaviour in offspring (Kuramoto, Runeson, Stuart, Lichtenstein, & Wilcox, 2013; Wilcox et al., 2010). This may be explained by observations that exposure to parental suicide in childhood often results in increased levels of depression, anxiety and bipolar and personality disorder, perhaps contributing to a heightened risk of suicide (Brent et al., 2009; Wilcox et al., 2010).

While the association between parental death and subsequent suicidal behaviours has been demonstrated by several existing reviews (Andriessen et al., 2016; Geulayov et al., 2012; Hung and Rabin, 2009; Kristensen et al., 2012; Kuramoto et al., 2009; Pitman et al., 2014) few studies have applied established theoretical models or frameworks to conceptualise the underlying mechanisms of suicidal behaviour following parental bereavement. Given the consensus that suicide is not an isolated act but results from a range of risk factors, it is necessary to organise the established research into coherent overarching theories or frameworks to better understand how these variables interact to explain suicidal behaviours (Barzilay and Apter, 2014; Karthick and Barwa, 2017). Such theoretical approaches can also guide researchers, practitioners and policy makers towards the implementation of effective interventions and educational practices.

To address this, we report a scoping review to identify all primary studies that reference a theory or framework to explain suicidal behaviour following childhood exposure to external-cause parental death. From these primary studies, the authors also wished to identify all theories that had been referenced to clarify the relationship between parental bereavement in childhood and subsequent suicidality. The amount of evidence available for each theory would then be used to examine patterns or trends in the suicide theories that are prominent in answering the current research topic.

A scoping review was deemed most appropriate as the research questions have not been previously examined and the field of suicide bereavement in childhood remains largely atheoretical (Barzilay and Apter, 2014). Hence, there is likely to be limited literature available on the topic. Likewise, scoping reviews are an effective tool for quickly examining the breadth and nature of knowledge within this broad field of interest where several study designs are represented (Mays et al., 2005; Munn et al., 2018; Tricco et al., 2018). Scoping reviews can also play a key role in rapid concept and policy mapping underpinning the theoretical basis of suicide etiology following parental bereavement in childhood, enabling the identification of gaps within the literature of previously unrecognised importance. It is optimised that a scoping review will inform more rigorous systematic reviews and meta-analytic studies within this field.

In this review, the terms “theoretical framework” and “theory” may be used interchangeably. Kaufman (2002) defined frameworks as “structures or schemes, composed of statements and concepts, which define and regulate and thus make possible the practices in which we engage” (p. 338). Similarly, a theory portrays how observed constructs in the world work, are developed over time through both ideation and observation and require both subjective and objective inquiry (Henderson et al., 2004; Jugdev, 2004; Weick, 1989). In this review, a theoretical framework is regarded as the systematic and detailed explanation that accounts for how and why childhood exposure to parental death is related to subsequent suicidal behaviour in adulthood.

## 2. Methods

### 2.1. Protocol

This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses – Scoping

Reviews, developed according to guidelines by the EQUATOR (Enhancing the QUALity and Transparency Of health Research) Network for the development of reporting guidelines (Tricco et al., 2018).

### 2.2. Eligibility criteria

#### 2.2.1. Inclusion criteria

Studies that met the following criteria were included in the review:

- i. Primary research articles with full text available;
- ii. Published in peer reviewed, English language journals and human studies;
- iii. Qualitative, quantitative or mixed methods methodology;
- iv. Studies which identify and provide a clear description of a theory, framework or model to explain the relationship between childhood exposure to external cause parental death and suicidal behaviour in adulthood. Studies which include evaluations or applications of the theory/framework/model will also be included.

For the purpose of this review, “exposure” referred to anyone knowing and/or identifying with a parent who died by external causes (Crosby and Sacks, 2002). This included “intergenerational transmission” and “parental history” of suicide deaths. The definition of “external causes of death” was based on the International Classification of Diseases, 10<sup>th</sup> revision (ICD-10) and are specified in Y85–Y84. The categories of external causes of morbidity and mortality include: 1) transport accidents, 2) other external causes of accidental injury, 3) intentional self-harm, 4) assault, 5) event of undetermined intent, 6) legal intervention and operations of war, 7) complications of medical and surgical care. In this review, “children” referred to all individuals below 18 years including adolescents, in alignment with several previous studies (Berg et al., 2016; Rostila et al., 2016).

The definition of suicide deaths in the current review was derived from the adapted version of the original WHO/EURO definition of suicide in 1986 which defines suicide as “an act with fatal outcome, which the deceased, knowing or expecting a potentially fatal outcome, has initiated and carried out with the purpose of bringing about wanted changes” (De Leo et al., 2006). Suicide attempts or non-fatal suicidal behaviour, with or without injuries, was defined according to the adapted version of the definition by WHO in 1994: “A nonhabitual act with nonfatal outcome that the individual expecting to, or taking the risk to die or to inflict bodily harm, initiated and carried out with the purpose of bringing about wanted changes”. Suicide attempts exclude non-suicidal self-injury which refers to self-injurious behaviour in the absence of suicidal intent (Miller et al., 2013). Suicidal ideation is defined as thoughts about engaging in behaviours intended to end one's life and can vary from fleeting thoughts about death to plans for suicide (Vander Stoep, McCauley, Flynn and Stone, 2009).

### 2.3. Information sources

Four key concepts were identified to guide the development of the search strategy: 1) parental death, 2) offspring/children, 3) suicide and 4) theoretical frameworks. Search terms (i.e., both indexed [e.g., Medical Subject Headings] and key words) associated with both concepts were derived independently by each author and in consultation with a subject matter expert librarian. An electronic search of six databases from the disciplines of medical and health sciences (Ovid MEDLINE, Cochrane Library, Ovid PsycINFO, Web of Science (all databases), EbscoHost CINAHL and Ovid EMBASE) was conducted on April 12, 2019 to locate studies from inception to April, 2019. In addition, a bibliographic review of included studies and a review of gold set articles was completed to locate additional studies.

### 2.4. Search

Keywords were all possible combinations of four concepts: parental death, offspring, suicide and theoretical framework. Parental death words included: (suicide OR parasuicide OR homicide OR death OR loss) AND (parent OR caregiver). Offspring words included: child, adolescent or youth. Suicide words included: suicidal ideation, suicide attempt and self-injurious behaviour. Words for theoretical framework included: theory, framework or model.

### 2.5. Selection of sources of evidence

Search results were exported into Endnote X8 software and duplicates were removed from the total number of identified records (see Figure 1). Records were then uploaded onto Covidence and two authors (PH, LB) independently completed an initial screening of titles and abstracts for eligibility. A priori inclusion and exclusion criteria were applied. Following title and abstract screening, the two authors (PH, LB) independently applied inclusion and exclusion criteria to the full texts of the remaining articles to retrieve theories that were not named in the abstract. Any conflicts between the two authors were resolved by a third author (MM).

### 2.6. Data charting process

A full-text review of each included study was conducted by two authors (PH, KH) and the following data items were extracted into a pre-tested data extraction sheet which includes the following variables: author, year of publication, country of origin, aims/purpose, study population, short description of theory/framework and key findings. A second author (MM) reviewed the data extraction, and disagreements were resolved via consensus.

We analysed the data in an iterative multiple-stage process (iterative text analysis) similar to (Lorenc et al., 2014), reading the description of the theory/framework/model, assessing it for the general inclusion criteria and categorising the theory as a psychological, cognitive, biological, social or developmental model.

## 3. Results

### 3.1. Selection of sources of evidence

The review process from identification to inclusion of studies is summarised in Figure 1 using the PRISMA flow chart. The combined searches identified 1598 articles and 272 duplicates which were removed. Altogether, there were 23 studies which met the inclusion criteria and were included in the review. Table 1 lists brief information on all included studies.

### 3.2. Characteristics of sources of evidence

Publication dates ranged from 1973 to 2018 (one between 1900 and 1999, three between 2000 and 2009, and 19 between 2010 and 2019). Studies were conducted in various countries including Australia (Ratnarajah and Schofield, 2008), Denmark (Jakobsen and E. Christiansen, 2011; Li et al., 2014; Mackrill and Hesse, 2012; Sorensen et al., 2009), UK (Shepherd and Barraclough, 1976), Netherlands (Garssen et al., 2011), Norway (Burrell et al., 2018; Gravseth et al., 2010), Sweden (Bjorkenstam et al., 2017; Bjorkenstam et al., 2018; Kuramoto et al., 2013; Kuramoto et al., 2010; Mittendorfer-Rutz et al., 2008; Niederkrotenthaler, Floderus, Alexanderson, Rasmussen and Mittendorfer-Rutz, 2012; Rostila et al., 2016; von Borczyskowski et al., 2011; Wilcox et al., 2010), USA (Hollingshaus and Smith, 2015; Spiwak et al., 2011), Taiwan (Lee et al., 2018) and China and Vietnam (Blum et al., 2012).

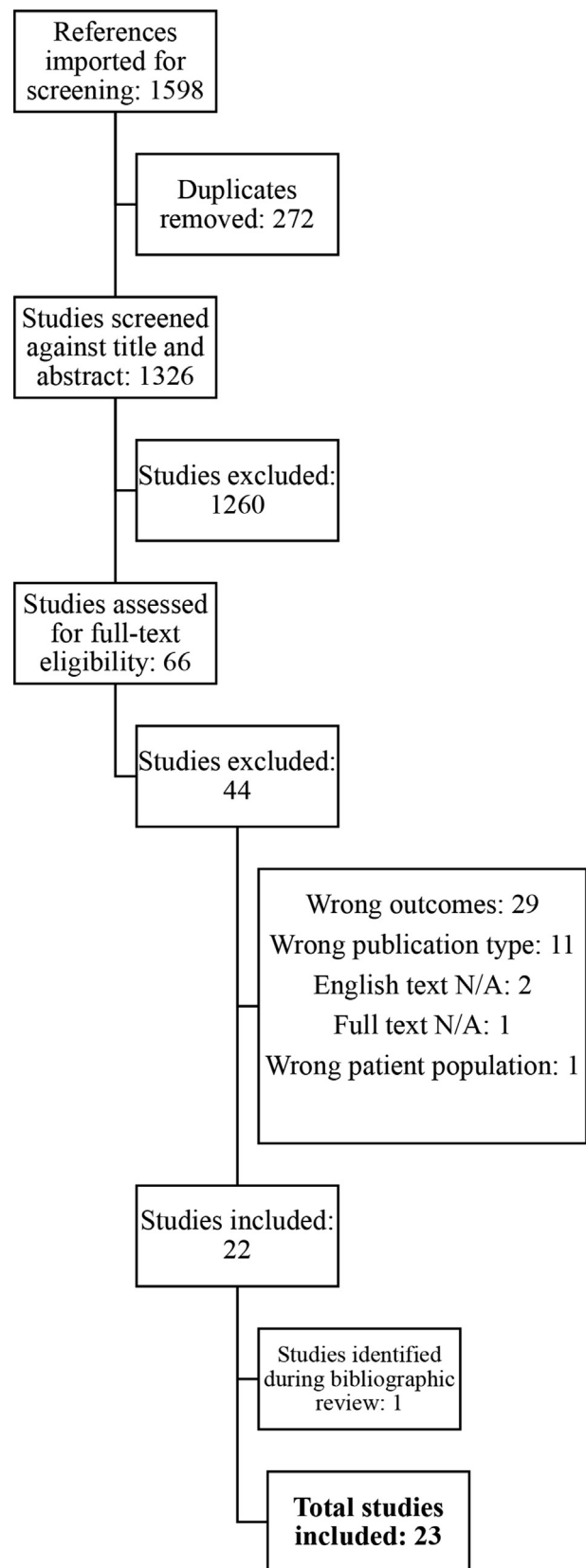


Figure 1. Study selection flow diagram.

**Table 1.** Studies reporting the association between childhood exposure to external cause parental death and suicidal behaviour in adulthood.

Theory/framework	Supporting studies (author, year of publication, country)	Brief description of theory/framework	Key findings
<b>Psychological models</b>			
Attachment theory (Bowlby, 1980)	Jakobsen et al. (2011)	Suggests losing a parent is one of the most serious, stressful life events for a child or adolescent and has significant ramifications for the remainder of the child's life and family system.	Findings indicated that young people who had lost one biological parent showed a significantly increased risk of attempting suicide. Losing the remaining parent nearly doubled the risk.
	Kuramoto et al. (2013)	Parental death can result in a permanent disruption of attachment which has long-term impacts on the mental wellbeing of the child. This may also depend on the quality of attachment before the loss.	The suicide risk in offspring who lost a parent to suicide or an unintentional injury during childhood surpassed the other age groups' risk approximately five years after the origin and, for the youngest group, continued to rise over decades.
	Hollingshaus et al. (2015)	Childhood is a sensitive period of development and attachment theory predicts that death of a parent (particularly the mother) will impair the child's development as they rely upon the parent to sustain life. Attachment theory applies more specifically during the first few years of life when the child is completely dependent upon the parental figure.	Parental death was associated with increased adult suicide risk before age 50.
	Shepherd and Barraclough (1976)	Theories of attachment and bonding which explain the relationship between parental loss and subsequent disturbance in children suggests bereavement by suicide has a particularly deleterious sequel resulting in feelings of rejection, guilt, depression, shame or anger towards the surviving parent.	Children who had been bereaved by the suicide of a parent had a higher incident of psychological morbidity compared to the control group. Some children coped with the experience of parental suicide without serious consequences.
	Rostila et al. (2016)	As small children are more dependent on their parents, parental death at a young age involves higher immediate stress levels, stronger feelings of grief, greater difficulty in accepting the death, and fewer available coping strategies for dealing with the death compared to older children.	Persons who had lost a parent to an external cause had the highest risk of being admitted to a hospital for a self-inflicted injury/poisoning after adjustment for sociodemographic confounders and risk factors among surviving parents.
<b>Biological-cognitive models of suicide</b>			
Familial transmission of suicide (Brent & Mann, 2005)	Bjorkenstam et al. (2017) Burrell et al. (2017) Burrell et al. (2018) Garssen et al. (2011) Gureje et al. (2011) Kuramoto et al. (2010) Li et al. (2014) Mackrill et al. (2012) Mittendorfer-Rutz (2008) Sorensen et al. (2009) Spiwak et al. (2011) von Borczyskowski et al. (2011) Wilcox et al. (2010)	Family, adoption, twin and molecular genetic studies have demonstrated higher rates of suicidal behavior and clustering in biological relatives of persons with suicidal behavior suggesting a genetic component to this increased risk (Gureje et al., 2011; Garssen et al., 2011).	All studies showed parental death by suicide increased the risk of suicidal behaviour in offspring. The odds of suicide increased with decreasing age at death of parent although sex of parent and offspring may have impact (Garssen et al., 2011; Kuramoto et al., 2010). Associations remained after controlling for comorbidity of parental disorders and mental disorders among offspring (Gureje et al., 2011; Bjorkenstam et al., 2017).
	Conservation of resources framework (Hobfoll, 1989)	Ratnarajah and Schofield (2008)	Outcome is determined not only by the initial loss but also by the individual's capacity to conserve resources that will help them cope with this adverse event.

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Table 1 (continued)

Theory/framework	Supporting studies (author, year of publication, country)	Brief description of theory/framework	Key findings
			result of attempts to make meaning from the tragic family history.
Stress model (Kaufman and Charney, 2001)	Hollingshaus et al. (2015)	Secondary losses from a parent's death that are experienced across the life-course likely involve chronic stress mechanisms of allostatic load. This may affect health through physiological mechanisms such as the sympathetic nervous system, hypothalamo-pituitary-adrenal axis, neuroendocrine system, immune system and inflammatory responses.	In addition to an increased risk of suicide, parental death was associated with increased risk of cardiovascular disease deaths for adults of all ages. This finding reinforced the importance of biological and social mechanisms in linking early parental death to adult mental health.
	Rostila et al. (2016)	Neurobiological studies have suggested that chronic stress in early childhood from parental death can influence brain development such that the risk of depression throughout life increases.	Adults who had lost a parent to an external cause death in childhood had the highest risk of being admitted to a hospital for a self-inflicted injury/poisoning after adjustment for sociodemographic confounders and risk factors among surviving parents.
Social models			
Socio-ecological model (Bronfenbrenner and Morris, 1998)	Blum et al. (2012)	Model of risk and protective factors which may predispose or moderate risk of suicide at the individual, family and school levels.	In multivariate logistic regression results, across the three cities, female gender, younger age, family structure, parental support, family history of suicide, migration status, and substance use were associated with suicidal ideation. Factors associated with suicidal attempt included female gender, family history of suicide, parental support, and substance use.
	Jakobsen et al. (2011) (Denmark) Case-control	Risk factors exist at multiple levels of an adolescents' social ecology including distal and proximal risk factors of both genetic and environmental origin (Perkins and Hartless, 2002).	The findings indicated that young people who had lost one biological parent showed a significantly increased risk of attempting suicide. Losing the remaining parent nearly doubled the risk. Relative risk was moderated by high income of the father.
Social learning theory/modelling/imitation (De Leo and Heller, 2008)	Spiwak et al. (2011) (USA) Cross-sectional	Following exposure to parental death, specifically suicide, a child may learn or replicate suicidal behaviours including methods that are modelled by their parents.	Compared to individuals with no suicidality, risk for lifetime suicide attempt was higher for individuals that were exposed to a caregiver's death by suicide. Associations remained significant after controlling for demographics, Axis I and II disorders and childhood adversity.
Social integration theory (Durkheim, 1951)	Hollingshaus and Smith (2015)	At the individual level, social integration theory may constitute the existence of a relationship of a given type. When parental death occurs, subjects lose one or two people in their social (parental) network, altering health through changes in social support, social regulation and conflict.	Early-life parental death was associated with an increased risk of suicide after age 18 for both sexes. A dose-response relationship was observed, where women with no living biological parents alive at age 18 had a higher risk for suicide than those with one biological parent and a stepparent before age 50. This association with remarriage may reflect the importance of lost social integration following parental death.
Developmental models			
Critical period hypothesis (Ben-Shlomo and Kuh, 2002)	Burrell et al. (2018)	Exposure to traumatic events before the age of 18 can have a more detrimental effect than if exposure occurs at other ages.	Losing a parent to suicide, transport accidents and other external causes of death was associated with an increased suicide risk in offspring. Suicide risk was highest in younger bereaved offspring, and bereavement had both short and long-term impacts on suicide risk.

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Table 1 (continued)

Theory/framework	Supporting studies (author, year of publication, country)	Brief description of theory/framework	Key findings
	<a href="#">Niederkrotenthaler et al. (2012)</a>	The life course approach is based on the assumption that the impact of biological and social risk and protective factors may vary with age at exposure due to the differential impact at different developmental stages ( <a href="#">Ben-Shlomo and Kuh, 2002</a> ).	A general pattern of increasing risk of suicide and attempted suicide in offspring with decreasing age at exposure to parental risk factors (including parental suicide) emerged.
Life course theory ( <a href="#">Kuh et al., 2003</a> )	<a href="#">Bjorkenstam et al. (2018)</a>	A negative life course trajectory during adolescence may hinder an individual's successful transition to adult life, resulting in heightened suicide risk during young adulthood.	A negative life course trajectory during adolescence, such as one that includes parental death, may reinforce the negative consequences of childhood adversity on an individual's interpersonal functioning, reduce social support, and hinder successful transitioning to adult life, resulting in heightened suicide risk during young adulthood.
	<a href="#">Gravseth et al. (2009)</a> (Norway)	Exposures acting at different life periods have an impact on risk for suicide.	Findings showed that early life factors such as birth order, maternal marital stability and parental suicide in childhood may be associated with suicide risk in young adulthood.
	<a href="#">Hollingshaus et al. (2015)</a> (USA)	The life-course approach links macrolevel social settings to individual biographies of health and recognises the vulnerable periods of early-life exposure to suicide.	Parental death in childhood was associated with increased adult suicide risk before age 50. For females, remarriage of widowed parent significantly exacerbated suicide risk after age 50.
	<a href="#">Lee et al. (2018)</a> (Taiwan)	There may be critical stages in an individual's development that predisposes them to an increased sensitivity to exposures. The suicide of a parent is especially disruptive when it occurs early in a person's life – when it occurs in adulthood, the impact is likely to be weaker.	Results did not support the life-course approach. Adult females exposed to parental suicide had the highest suicide risk elevation – those exposed in childhood/adolescence had approximately half the risk. The risk for subsequent suicide in male offspring exposed to parental suicide was not significantly different between adults and children/adolescents who were exposed.
	<a href="#">Rostila et al. (2016)</a>	Suggests that social phenomena do not have uniform effects across a population, age- or gender-wise. Childhood could be considered a "sensitive" period for the loss of a parent and may continue to influence health over the life span.	Losing a father before school age was associated with a higher risk of hospital admission for a self-inflicted injury/poisoning than was loss at an older age for both genders. Maternal loss before school age was associated with a higher risk only for men.
Developmental model of antisocial behaviour ( <a href="#">Patterson et al., 1989</a> )	<a href="#">Bjorkenstam et al. (2018)</a>	Parents in families with children who act out tend to be noncontingent and unsuccessful when attempting to reinforce prosocial behaviour and discourage negative behaviour.	Cumulative CA was associated with risk of suicide in non-convicted and convicted youths, who had a higher risk of suicide. Adolescent violent offending partly mediated the association between CA and suicide.

### 3.3. Results of individual sources of evidence

The specific theories identified covered a range of biopsychosocial frameworks and included attachment theory (n = 5), familial transmission of suicide (n = 13), conservation of resources framework (n = 1), diathesis-stress model (n = 2), social integration theory (n = 1), socio-ecological model (n = 2), social learning theory (n = 2), critical period hypothesis or life course approach (n = 7) and the developmental model of antisocial behaviour (n = 1). Each individual theory or framework is presented below.

#### 3.3.1. Biological-cognitive models of suicide exposure

**3.3.1.1. Familial transmission of suicide.** Thirteen studies mentioned familial transmission of suicide as a potential explanation for offspring suicide in adulthood following exposure to parental death in childhood. This theory was largely supported by the family, adoption, twin and molecular studies in the review which demonstrate that there may be a genetic component to suicide, given the observation of suicide clusters involving biological relatives (Mittendorfer-Rutz et al., 2008; Gureje et al., 2011; Garssen et al., 2011). One study even observed clusters of suicide attempts among siblings and parent-child dyads which were strong predictors of subsequent youth suicide attempts (Mittendorfer-Rutz et al., 2008). Several studies also posited that the transition from suicidal ideation to attempts may be predicted by a familial history of impulsive aggressive traits, psychiatric illness, neurocognitive prerequisites and hypothalamic-pituitary-adrenal axis dysfunction (Gureje et al., 2011; Li et al., 2014; von Borczyskowski et al., 2011). Although intergenerational transmission of psychiatric disorders increases the risk for suicide, suicidal behaviour appears to run in families independently of psychiatric diagnoses (Wilcox et al., 2010) suggesting a more complex interplay of genetic predisposition and socialised behaviours. Altogether, these studies verified that shared biological and psychological vulnerabilities within families may contribute to suicide among adults who experienced the death of a parent in childhood.

**3.3.1.2. Conservation of resources theory.** One study (Ratnarajah and Schofield, 2008) mentioned the conservation of resources framework by (Hobfoll, 1989) which purports that the outcome of an adverse event is not only determined by the initial loss but also by the individual's capacity to conserve resources that will help them cope with the adversity. This theory was supported by findings from Ratnarajah and Schofield (2008) which documented the secondary losses following a parent's death by suicide, such as changes in living environment and family relationships. For some bereaved offspring, there was unity among the surviving spouse and children which was a protective factor against subsequent suicidal behaviour. However, for others, family disintegration was evident such as when the surviving offspring were forced to

move in with their grandparents and confront additional difficulties such as the pressure of three generations living together. There was also loss of economic support, a child's capacity to adapt and become resilient is largely compromised (Ratnarajah and Schofield, 2008). There was also recurring evidence in the study that as adults, the bereaved offspring needed to restore to themselves the things that were lost following parental suicide including material items, educational opportunities and love and security within a family. These losses may accumulate and weaken the individual's capacity to adapt to developmental changes throughout the lifespan, compounding their risk of suicidal behaviours in adulthood.

**3.3.1.3. Diathesis-stress model.** Two studies (Hollingshaus and Smith, 2015; Rostila et al., 2016) described the stress-response, which purports that experiencing chronic stress or grief in early childhood can acutely or chronically impair brain development and neurobiological pathways such that the risk of physical and psychological conditions in adulthood increases. This is further compounded by the observation that parental death is often associated with chronic grief and stressors across the life-course which leads to accumulating allostatic load in later life affecting health through physiological mechanisms such as the immune system and inflammatory responses. For instance, Rostila et al. (2016) found that losing a father before school age was associated with a higher risk of hospital admission for a self-inflicted injury/poisoning compared to losses at older ages. Another potential stressor is remarriage of the widowed parent which can heighten conflict and tensions within families and extended kin networks (Hollingshaus and Smith, 2015). As described in the studies identified, these stressors can increase an individual's risk of physical illnesses, such as cardiovascular disease as well as psychiatric disorders including major depression, borderline personality disorder, post-traumatic stress disorder and suicidal behaviours (Beauchaine et al., 2011; Heim et al., 2008; Rostila and Saarela, 2011).

#### 3.3.2. Psychological models

**3.3.2.1. Attachment theory.** Five studies (Hollingshaus and Smith, 2015; Jakobsen et al., 2011; Kuramoto et al., 2013) mentioned attachment theory, originally proposed by Bowlby (1980). This theory broadly posits that attachment results from a person attaining or maintaining proximity to another individual who is perceived as better able to cope with the world. In the context of parent-child attachment, Bowlby's theory established that close physical and emotional ties or bonds to primary caregivers, particularly mothers are critical in early childhood.

The studies provided support for attachment theory and the permanent disruption of attachment following parental death by describing it as a potential explanation for the finding that young children who had lost at least one biological parent had a significantly increased risk of attempting suicide (Jakobsen and Christiansen, 2011) or being

Diversity of risk factors addressed by biopsychosocial theories

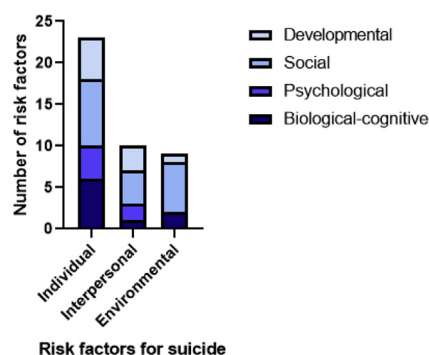


Figure 2. Bar chart showing number of risk factors addressed by biopsychosocial models.

Number of risk factors for suicide in biopsychosocial theories

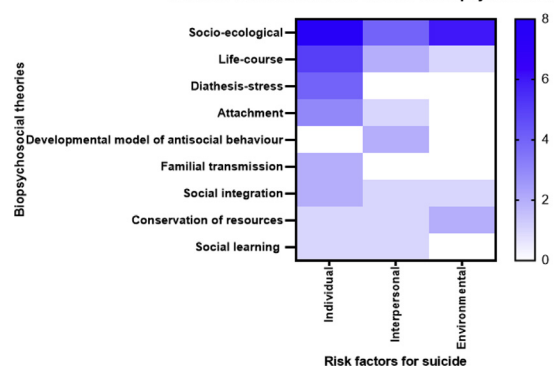


Figure 3. Heat map showing number of risk factors for suicide in each of the theories.

**Table 2.** Risk factors for suicide addressed by each of the biopsychosocial theories.

	Individual	Interpersonal	Community/societal
Familial transmission	<ul style="list-style-type: none"> <li>• Genetic predispositions – psychiatric illness, neurocognitive prerequisites</li> <li>• Impulsive/aggressive traits</li> </ul>		
Conservation of resources theory	<ul style="list-style-type: none"> <li>• Accumulative stress</li> </ul>	<ul style="list-style-type: none"> <li>• Family conflict</li> </ul>	<ul style="list-style-type: none"> <li>• Poor living conditions</li> <li>• Limited economic support</li> </ul>
Diathesis-stress	<ul style="list-style-type: none"> <li>• Neurodevelopmental conditions</li> <li>• Accumulative stress</li> <li>• Physical illness</li> <li>• Mental illness</li> </ul>		
Attachment theory	<ul style="list-style-type: none"> <li>• Loss of attachment</li> <li>• Accumulative stress</li> <li>• Mental illness</li> </ul>	<ul style="list-style-type: none"> <li>• Relationship conflicts</li> </ul>	
Social learning theory	<ul style="list-style-type: none"> <li>• Demographics: age/gender</li> </ul>	<ul style="list-style-type: none"> <li>• Imitation effects</li> </ul>	
Social integration theory	<ul style="list-style-type: none"> <li>• Physical illness</li> <li>• Mental illness</li> </ul>	<ul style="list-style-type: none"> <li>• Low social regulation/support</li> <li>• Family conflicts</li> </ul>	<ul style="list-style-type: none"> <li>• Limited economic support</li> </ul>
Socio-ecological model	<ul style="list-style-type: none"> <li>• Neurodevelopmental conditions</li> <li>• Loss of attachment</li> <li>• Demographics: young, male</li> <li>• Genetic predisposition</li> <li>• Physical illness</li> <li>• Mental illness</li> <li>• Accumulative stress</li> <li>• Impulsive/aggressive traits</li> </ul>	<ul style="list-style-type: none"> <li>• Family conflict</li> <li>• Low social regulation</li> <li>• Relationship conflicts</li> <li>• Exposure to death/suicide/imitation effects</li> </ul>	<ul style="list-style-type: none"> <li>• Poor living conditions</li> <li>• Limited economic support</li> <li>• Limited educational opportunities</li> <li>• Exposure to prejudice</li> <li>• Access to lethal weapons</li> <li>• Low levels of religiosity</li> </ul>
Life-course approach	<ul style="list-style-type: none"> <li>• Neurodevelopmental conditions</li> <li>• Age of exposure</li> <li>• Mental illness</li> <li>• Impulsivity/aggressive traits</li> <li>• Accumulative stress</li> </ul>	<ul style="list-style-type: none"> <li>• Family conflict</li> <li>• Low social regulation</li> </ul>	<ul style="list-style-type: none"> <li>• Limited economic support</li> </ul>
Developmental model of antisocial behaviour		<ul style="list-style-type: none"> <li>• Imitation effects</li> <li>• Family conflict</li> </ul>	



Table 3. Main implications of review for practice, policy and research.

Implication	Description
Medical practitioners and mental health workers could devise more multilevel approaches to suicide intervention and address discrete risk and protective factors at both individual and interpersonal as well as wider community and societal levels and fluctuations in how they are manifested overtime (Cramer and Kapusta, 2017; Karthick and Barwa, 2017).	A multi-level approach to suicide prevention would require collaboration between a range of healthcare professionals, community service organisations and government agencies and large-scale changes to health systems and clinical providers. This represents a shift from traditional models of suicide to more of a public health approach highlighting the role of socio-cultural and environmental determinants of suicide (Caine et al., 2018).
Findings from the scoping review provide a basis for more rigorous systematic reviews and meta-analytic studies of the literature.	Systematic reviews and meta-analytic studies will provide a critical assessment of the quality of evidence available and the robustness of results (Munn et al., 2018).
Theories identified in the scoping review have highlighted strengths and limitations in the theoretical evidence base that can be resolved in future studies within the suicide prevention field at large.	The theories are diverse and account for a range of biopsychosocial factors. However, there continues to be a predominance of biological and psychological explanations and fewer social theories which provide contextual information for the development of suicidal tendencies (Hollingshaus and Smith, 2015). Lack of integrated and multifactorial models is also evident. These limitations need to be addressed to ensure policy makers and other relevant stakeholders can draw from a stronger theoretical evidence base in the development of multi-level programs or strategies.

hospitalised for self-inflicted injury (Rostila et al., 2016), a risk which continued to rise for decades (Kuramoto et al., 2013), particularly for adults under age 50 (Hollingshaus and Smith, 2015). This may pertain to the observation that compared to adult offspring, a parent's role as caregiver and attachment figure is more pronounced for children, particularly during the first few years of life, as they are more materially and emotionally dependent on their parents (Bowlby, 1980). Hence, early separation experiences, for instance through parental death, can result in chronic stress responses and grief processes including anger, anxiety, depression and emotional detachment that adversely affects the child's behavioural trajectories. These consequences often lead to the development of insecurity, low self-esteem and difficulty establishing and maintaining secure attachments with others in adulthood (Sandler et al., 2003). Shepherd and Barraclough (1976) also suggested that a loss of attachment in childhood due to parental death may not necessarily result in adverse consequences for children who have enough resources to cope with the loss, particularly from the surviving parent. This magnifies the importance of strong bonds between caregiver and child to facilitate healthy psychosocial development and protection from increased suicide risk.

**3.3.2.2. Social learning theory.** One study (Spiwak et al., 2011) mentioned modelling or imitation theories, originally proposed by Bandura and Mischel (1965) which suggest that following exposure to parental suicide, a child may learn, or in some cases observe and replicate suicidal behaviours including methods that are modelled by their parents. Gender-related learning theories posit that this may be especially true in the case of a same-sex parent who is usually the model of identification for the child and contributes more to their overt behaviour and internal sense of self. Spiwak et al. (2011) suggested these characteristics of social learning may have contributed to the finding that risk for suicide attempt was higher for individuals who had been exposed to a suicide attempt or death by suicide. The study recognised the parent or caregiver's position as a 'role model' in the child's life and vicarious operant conditioning principles may be at play when children learn and replicate behaviours performed by their parents.

### 3.3.3. Social models of suicide exposure

**3.3.3.1. Social integration theory.** One study applied one of the earliest theories of suicide, the social integration theory proposed by Durkheim in 1897 to explain the interplay between social and biological mechanisms in suicide etiology (Hollingshaus and Smith, 2015). Social integration occurs when an individual is incorporated into the social norms and structures within a society and engaged in affiliations or relationships with others (House et al., 1988). Hollingshaus and Smith (2015) described how this level of integration is reduced after parental death given that the changes in children's physical and psychological health impact on levels of social support and regulation. For instance, losing a parent may reduce socioeconomic resources and parental discipline against unhealthy behaviours such as substance abuse and weaken the surviving parent's capacity to provide material resources and emotional support for their children. Similarly, the authors observed a dose-response relationship where women with no living biological parents alive at age 18 had an increased suicide risk compared to those with one biological parent and a stepparent. This suggests that parental remarriage or the maintenance of relationships that help compensate for the loss of a parent following bereavement increase social integration, thereby reducing the risk of suicidality. This notion was further supported by findings from (Bjorkenstam et al., 2017) which were in favour of the social causation hypothesis suggesting that the risk of suicide is significantly explained by factors in an individual's economic status.

**3.3.3.2. Socio-ecological model.** Two studies referenced a variation of the socio-ecological model which has been used to guide research and debates in social epidemiology including the study of suicidal behaviour (Blum et al., 2012; Jakobsen and Christiansen, 2011). Bronfenbrenner and Morris' (1998) social-ecological framework, which guided the study by (Blum et al., 2012) suggests that risk factors for suicide exist at various levels of a person's ecology and these involve the nested roles of family, peer, school, community and national contexts. The extent to which these contexts act as risk or protective factors for suicidal behaviour is influenced by a range of universal and culturally-specific factors. Similarly, Perkins and Hartless' (2002) ecological model mentioned by (Jakobsen and Christiansen, 2011) purports that there are multiple causes of suicide among youth which involve both distal (interpersonal factors such as family conflict or environmental risks including access to health services) and proximal risk (individual-level characteristics such as age, sex and ethnicity) and protective factors of genetic and environmental origin. Also central to this socio-ecological model is the idea of cumulative risk which posits that as individuals are exposed to more risk factors at multiple levels of the ecology, the likelihood of their suicidal behaviour also increases (Perkins and Hartless, 2002).

The studies in this review (Blum et al., 2012; Jakobsen et al., 2011) provided support for the socio-ecological model by demonstrating the range of risk and protective factors which influence the relationship between childhood exposure to parental death and suicidal behaviour in adulthood. For instance, Blum et al. (2012) found female gender, parental support and substance use were associated with suicidal attempts, in addition to parental history of suicide. Jakobsen et al. (2011) reported that the risk of suicide was higher within the first year of parental death, for deaths by suicide compared to other external causes and for children from low income families. In sum, it appears that there may not be a direct relationship between parental death and suicide. Instead, the risk of subsequent suicidality should be assessed on the basis of a range of factors and can be understood from a socio-ecological perspective.

### 3.3.4. Developmental theories of suicide exposure

**3.3.4.1. Life course approach/critical period hypothesis.** Three studies mentioned the life course approach (Bjorkenstam et al., 2018; Gravseth et al., 2009; Hollingshaus et al., 2015) which suggests that the impact of risk and protective factors for suicide varies with the age of exposure. This may be due to the accumulation of exposures during the lifespan, a latency in outcome manifestation or specific developmental changes that mainly occur during a specific age window (Ben-Shlomo and Kuh, 2002). Evidently, this approach acknowledges the vulnerable periods of early life exposure to suicide, similar to the critical period hypothesis which was cited by four studies (Burrell et al., 2018; Niederkrotenthaler et al., 2012; Lee et al., 2017; Rostila et al., 2016). Childhood is a developmental stage associated with increased physiological plasticity while adolescents are vulnerable to various biopsychosocial transitions responsible for impulsivity and risk-taking or sensation-seeking behaviours (Rostila et al., 2016). As the stage of adolescence is detrimental to shaping individuals for adulthood, exposure to traumatic events can lead to emotional dysregulation, reduced self-esteem and self-worth and maladaptive coping mechanisms such as aggression, hostility and violence which impede successful transition to adult life and increase the risk of suicide (Bjorkenstam et al., 2018). Moreover, parental death is typically considered a premature or unexpected event when it occurs in childhood since it is not commonly anticipated among youths (Lee et al., 2017). Parental loss may therefore be associated with higher immediate stress levels, more complex grief experiences, greater difficulty in accepting the

death and fewer coping strategies acquired to adjust to the death (Rostila et al., 2016).

Most studies retrieved in the review supported the critical developmental period hypothesis for explaining suicidal behaviour following parental bereavement. Gravseth et al. (2009) examined several national registers in Norway to find that suicide in young adults is often related to early childhood experiences including parental suicide. Wilcox et al. (2010) analysed Swedish registers to assess suicide risk among offspring exposed to parental suicide during three developmental stages: childhood, adolescence and young adulthood. The authors found that exposure to parental suicide in childhood and adolescence increased the subsequent suicide risk by about threefold compared to offspring of living parents. Conversely, young adults exposed to parental suicide were not found to be at an increased risk. Similarly, Niederkrotenthaler et al. (2012) analysed linked datasets from Sweden and found that younger age at exposure to parental suicide (particularly prior to age 10) was most strongly associated with subsequent suicide mortality. A later study by Rostila et al. (2016) examined a national cohort in Sweden and found that death of a father before school age was associated with a higher risk of hospital admission for self-injury or poisoning than loss at an older age for both males and females.

Support for the life course approach was also provided through studies on the effect of time since bereavement on subsequent suicidal behaviour. Burrell et al. (2018) found that the risk is most pronounced either directly following bereavement or after more than 15 years, suggesting both immediate and long-term effects. Short-term effects are likely caused by the trauma and loss itself whereas long-term effects are often the product of developmental challenges associated with family dysfunction following parental death. For instance, remarriage of the surviving parent may either provide another prominent social tie for the offspring, which acts as a protective factor, or it may increase conflict in the family and further compound their suicide risk (Hollingshaus et al., 2015). Thus, the life course framework also highlights secondary chronic stressors that can exacerbate suicide risk, familial transmission of suicidal behaviours through "linked lives" and supports the notion that recovery from traumatic losses is a lifelong process (George, 2002; Kuh and Shlomo, 2004).

It is noted however that one study in this review (Lee et al., 2018) did not find support for the life course approach or critical period hypothesis. The study found that the risk of suicide among girls under 18 that had been exposed to parental suicide was approximately half the suicide risk of women exposed to parental suicide. This contradicts the notion that exposure to parental death during childhood would have more detrimental effects on subsequent suicidal behaviour compared to exposure in adulthood. For male offspring exposed to parental suicide, the risk for subsequent suicide was not significantly different between adults and children or adolescents. The authors posited that irrespective of sex, children who lose a parent may not be mature enough to fully comprehend the meaning of suicide stigma as well as their social circumstances (i.e. loss of social support). Thus, they may be less prone to intense feelings of shame and isolation (Umberson et al., 1996).

**3.3.4.2. Developmental model of antisocial behaviour.** One study (Bjorkenstam et al., 2018) identified a model proposed by Reid and Patterson (1989) which suggested that children develop antisocial behaviours through parent-child interactions. For instance, parents in families with children who exhibit conduct disorders tend to engage in ineffective parenting practices such as harsh and inconsistent discipline, little involvement with the child and poor supervision. Thus, they fail to reinforce prosocial behaviours and discourage negative conduct. In the context of suicidal behaviour and the influence of parenting, findings by Bjorkenstam et al. (2018) indicated that children may learn violent or

antisocial behaviours from their parents' suicidal attempts or deaths or how the surviving caregiver copes with the loss. Thus, they may develop aggressive, disruptive behaviours that culminate in more self-directed violent acts such as suicide.

## 4. Discussion

### 4.1. Summary of evidence

There is much overlap between the theories presented and their suggestions regarding the explanatory factors for suicide following parental bereavement. For instance, attachment theory, diathesis-stress model and life course approach all address the impact of cumulative or chronic secondary stressors which cover a range of biopsychosocial outcomes such as mental illness, financial difficulties, relationship conflicts and changes in living arrangements. The subsequent "psychological scarring" (Pearlin et al., 1997) and increased suicide risk that can often occur as a result of these outcomes and the reduced social support from surviving caregivers is also consistent with the social integration theory (Hollingshaus and Smith, 2015). Both attachment theory and the life course approach regard childhood as a critical age window for development and stressors experienced during this time are likely to impair the offspring's transition to adulthood, how they regulate aggressive and impulsive tendencies as well as their coping mechanisms when faced with subsequent life events (Sandler et al., 2003; Jakobsen et al., 2011). Likewise, all the risk factors addressed by the theories are essentially captured by the socio-ecological model which covers risks at all levels of a person's ecology including individual (neurodevelopmental conditions, genetic predisposition, physical/mental illness), interpersonal (loss of attachment, relationship conflicts, low social regulation family conflict, depression), community/societal factors (poor living conditions, limited educational opportunities, exposure to prejudice, stigma, discrimination).

Given the overlap between the models, Figure 2 groups each of the individual theories into biological-cognitive, psychological, social or developmental models and presents the number of risk factors addressed by each domain. The authors deemed it appropriate to group the theories in accordance with these categories as they have been used to organise theories of suicide in past reviews and draw attention to the need for a multi-level and holistic approach to conceptualising suicide etiology (Karthick and Barwa, 2017; Gunn and Lester, 2015). The figure illustrates how, despite a predominantly biomedical and psychological approach to suicide which focuses on internal experiences, the risk factors covered by each of these models transcend the individual and involve the nested roles of larger-scale societal influences. It is still apparent however, that interpersonal and environmental risk factors are mostly addressed by social theories while individual-level factors are best represented by biological-cognitive and psychological models. Relying on a single domain or stream of suicide theories may not adequately address all relevant contributors to suicide after parental death.

To look more closely at the separate theories, Figure 3 captures the number of individual, interpersonal and community/societal-level factors that are addressed by each of the models identified in this review. The specific individual, interpersonal and environmental risk factors are listed in Table 2. It is evident that there are similarities between the models in terms of the level of risk factors that they address. Almost all theories cover individual-level factors, particularly the socio-ecological, life-course, diathesis-stress and attachment theories. Consistent with the suicide literature at large, environmental or community/societal factors were least represented.

The notion of developing an integrated model has been advocated by previous studies that examined adverse childhood events and parental death more broadly including Hollingshaus (2015) which asserted that

social forces affect psychological states by acting through biological mechanisms and hence a combination of the two perspectives will improve our understanding of suicide. The authors integrated the life-course approach within a biopsychosocial framework to explain how early-life parental death can result in multiple secondary stressors, moderated by familial vulnerabilities and other early life stressors which subsequently affect behavioural health. Given the overlap between theories presented in this review and the common understanding that no single theory or framework adequately explains all outcomes of suicide (Karthick and Barwa, 2017), it was proposed that for future studies, an integrated biopsychosocial model could be developed to address the diverse range of risk factors and ensure it is specific to parental bereavement.

### 4.2. Criticisms of theories identified

The existing theories identified in this review have largely focused on a single underlying factor or domain of risk. This is also a criticism of suicide theories in the literature more broadly which tend to have a narrow focus and do not account for new developments in the evidence base (O'Connor, 2011). For instance, Baumeister's (1990) escape from self theory posits motivation as the main driving force behind suicidal behaviours while the cognitive model of suicidal behaviour (Wenzel & Beck, 2008) focuses solely on cognition without addressing biological or psychological influences. Suicide theories have also been criticised for being overly simply or largely overlapping, derived mainly from well-established theories such as Durkheim's social integration theory, Shneidman's theory of psychache, Beck's cognitive triad and Baumeister's escape from self theory (Nock et al., 2019). This provides further support for an integrated model to synthesise the key premises of the predominant theories in the field and perhaps move beyond these commonly cited theories to uncover novel explanatory factors for suicide (Nock et al., 2019).

Evidence in support of the life course approach in a population of bereaved offspring is still considerably sparse especially as few prospective studies have investigated developmental pathways of youths over an extended period (Bjorkenstam et al., 2018; Hollingshaus et al., 2015). Likewise, although the socio-ecological model accounts for a range of risk factors, there is less understanding of how exactly they influence later suicidal behaviour, whether independently and directly or through interactions with a range of other factors (Spiwak et al., 2011). There have been previous calls for a cumulative risk model (Rutter, 1979) which would clarify whether the likelihood of engaging in suicidal behaviour is dependent on the number of risk factors rather than the specific type of risk factor. Furthermore, most studies that have investigated the socio-ecological model in the context of parental bereavement have been cross-sectional in nature which limits their ability to establish causality (Blum et al., 2012). Longitudinal studies, particularly to capture the onset of psychosocial risk factors in early adolescence may provide useful knowledge on the trajectory of suicidal behaviour (Blum et al., 2012).

### 4.3. Limitations, future directions and implications

It was beyond the scope of this review to conduct rigorous testing and evaluation of the theories identified. Future research could extend on this study by developing criteria to assess the range of theories and frameworks on suicide exposure, as well as the studies providing evidence for these theories, in order to guide future theory development as well as policies, programs and interventions. Nonetheless, this review has highlighted the overlap and consistency between several theoretical approaches and their strengths as well as limitations in explaining the relationship between parental death and suicidal behaviours. Table 3

provides a description of the main implications of the review for practice, policy and research.

## 5. Conclusions

In summary, the present study addressed calls in previous literature for the identification of theories or frameworks that explain the relationship between childhood exposure to external cause parental death, including suicide, and subsequent suicidal behaviour in adulthood. Nine theories were identified and included biological, psychological and social perspectives of which the life course approach and familial transmission of suicide emerged as the most common theories. Given the complex aetiology of suicidal behaviour following parental death, we propose the future development of an integrated biopsychosocial framework that can be applied to account for the interaction of multiple factors influencing the suicide risk among bereaved offspring. However, further study is required to supplement this review of the existing theories and critically assess the validity of their premises. Ultimately, this review provides a synthesis of theories of suicide aetiology following parental bereavement that can be used to guide decisions made by researchers, practitioners and policymakers and inform the development of an integrated theory of suicidal behaviour following exposure to external cause parental death.

## Declarations

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The authors declare no conflict of interest.

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