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Review article

A review and conceptual model of the association of Type D personality with suicide risk

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ABSTRACT

The role of personality as distal risk factor for suicidal thoughts and behavior is still unclear. This review aims to propose two conceptual models that explain the psychological plausibility of Type D personality as distal risk factor and contributor to the transition from general to suicide distress. To support this aim, we performed a systematic review of existing studies on the association between Type D personality and suicidal distress. A systematic search yielded eight studies that reported on Type D personality and suicidal distress. Type D personality was robustly associated with suicidal thoughts and behaviors, across populations and countries. Type D was related to the level/frequency of suicidal ideation in seven studies, and suicide attempt in two studies. Our first theoretical model identifies intra-psycho (depression, alcohol misuse, posttraumatic stress) and interpersonal (low belonging, social isolation, lack of support) vulnerabilities of individuals with Type D that may fuel the development of suicidal thoughts and behaviors. Type D by itself will not account for why people become suicidal, but our second theoretical model suggests that the avoidant-passive tendencies of Type D individuals may result in persistent problem-solving deficits, and, eventually, feelings of entrapment that may contribute to the desire to escape from pain. We conclude that empirical evidence supports the hypothesized link between Type D personality, and suicidal thoughts and behaviors. Our conceptual models – albeit often supported by indirect evidence – further substantiate the plausibility of this link, and offer concrete guidance for future studies. Primarily, more longitudinal research is necessary.

1. Introduction

The societal and psychological burden of suicide is considerable (Hawton and van Heeringen, 2009; O'Connor and Nock, 2014). Suicidal tendencies are never the consequence of one single cause, but rather result from the interaction of many risk factors (Cameron et al., 2017; Franklin et al., 2017; Hawton and van Heeringen, 2009; O'Connor and Nock, 2014). Suicidal ideation precedes suicide attempts, and attempted suicide is a major risk factor for suicide death (Giegling et al., 2009). In addition, most – but not all – persons who complete suicide have psychiatric disorders, including mood, alcohol-related, and personality disorders (Hawton and van Heeringen, 2009). A recent meta-analysis has suggested that our ability to predict who is at risk for suicide has not improved substantially across 50 years of research (Franklin et al., 2017). To improve our understanding of suicide, we need to establish more in-depth how different risk factors heighten the vulnerability to

suicidal thoughts and behaviors (Cameron et al., 2017).

Stress-diathesis models posit that suicidal thoughts and behavior involve a vulnerability (diathesis) that predisposes individuals to suicidal tendencies when stress is encountered (Hawton and van Heeringen, 2009; O'Connor and Nock, 2014). Psychiatric disorders or acute crises are proximal, state-dependent triggers, while personality characteristics such as hopelessness and impulsivity are distal, trait-dependent vulnerabilities (Hawton and van Heeringen, 2009; O'Connor and Nock, 2014). Although suicide research on personality traits as distal risk factors is ongoing (McGirr and Turecki, 2007), it is currently impossible to draw clear conclusions about the involvement of personality in suicide (Batty et al., 2018a). This review focuses on Type D (*distressed*) personality as a potential distal trait-dependent risk factor for suicidal thoughts and behavior (Denollet, 2005). It is defined by the combination of high negative affectivity, a propensity to experience negative emotions, with high social inhibition, a tendency to experience interpersonal

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sensitivity, fear of negative evaluation, and the consequential hesitance to engage in social contact. Type D personality is a dimensional trait rather than a clinical condition. Scoring above the established cut-off of 10 on both subscales of a validated Type D measure that assess negative affectivity as well as social inhibition, suggests the presence of Type D personality. The prevalence is 15–25% in the general population (Denollet, 2005). Type D personality has substantial genetic underpinnings contributing to long-term stability of the construct within adult individuals (Kupper et al., 2011; Li-Gao et al., 2020). Type D personality identifies persons with increased risk for recurrent cardiac events (Denollet et al., 2013), and mental disorders including depression, alcohol abuse, and social phobia (Beutel et al., 2018; Lambertus et al., 2018; Michal et al., 2011). Type D personality is related to, but different from, several clinical conditions linked to suicidal distress. First of all, Type D personality does not equal depression and has independent predictive qualities (Denollet, 2009; Kuijpers et al., 2007). First empirical studies have shown a significant association between Type D personality and suicidal ideation (e.g. Ladwig et al., 2010; Michal et al., 2010; Yoon et al., 2015). Findings also showed that in patients with major depression, those who *also* had Type D personality were more vulnerable for suicidal ideation than those diagnosed with major depression alone (Park et al., 2014). Furthermore, Type D is related to cluster B and C personality disorders. The negative affectivity component of Type D personality is known to underlie the emotional instability central to cluster C personality disorders, and some cluster B personality disorders including borderline personality disorder (Samuel and Widiger, 2008; Siever and Davis, 1991). The social inhibition component of Type D personality is a diagnostic criterion for avoidant personality disorder (Weinbrecht et al., 2016). Both traits that underlie Type D personality have unique associations with suicidal thoughts and behavior. Most research focused on negative affectivity in the context of suicidal distress, while less research focused on social inhibition. Negative affectivity, as well as neuroticism, are both associated with suicidal thoughts and behavior (O'Connor and Nock, 2014; Yen et al., 2009). For example, previous studies showed low mood to be more closely related to neuroticism among individuals with suicidal ideation as compared to individuals without suicidal ideation (Cameron et al., 2017), and higher neuroticism was related to higher suicide-related mortality (Batty et al., 2018a). In another study, negative affectivity was a more robust predictor of suicide attempts than impulsivity (Yen et al., 2009). Moreover, chronic distress has been related to elevated suicide rates (Batty et al., 2018b), as well as people who are more sensitive to distress, and are socially disconnected (O'Connor and Nock, 2014). Importantly, Type D personality is different from negative affectivity as the *synergistic combination* with social inhibition is essential to the construct, and amplifies its value as an intermediate phenotype (Denollet, 2005).

In conclusion, although Type D personality is a promising distal trait-dependent risk factor for suicidal distress that needs further research attention, conceptual guidance is currently lacking. In this paper we perform a systematic review of existing studies on the association between Type D personality and suicidal distress as input for the proposition of two conceptual models. In these models, we explain the psychological plausibility of Type D as distal risk factor and contributor to the transition from general to suicide distress.

2. Methods

2.1. Search strategy

Following Preferred Reporting Items for Systematic reviews and Meta-Analyses guidelines (Moher et al., 2015), eligible studies were systematically identified by searching electronic databases PubMed, Google Scholar, and Web of Science for relevant literature (1980–March 15, 2019). Our search terms included “Type D personality AND (“suicidal ideation” OR suicide OR “thoughts of death”). In addition,

reference lists of included studies were scanned to identify additional studies.

Studies were independently identified by two authors (JD, NK), following standardized criteria: cohort studies in adults (age > 18), published in English as an original research article, until March 15, 2019, including associations of Type D personality with suicidal ideation, suicide attempts, or completed suicides. Both prospective and cross-sectional studies were included.

3. Results

3.1. Search strategy and study selection

A flow chart of the study identification and selection process is presented in Fig. 1. We identified eight research articles for inclusion. The search of Pubmed, Google Scholar, and Web of Science provided 378 articles, after removal of duplicates. After reviewing titles and abstracts 98% of these did not meet our inclusion criteria, mostly due to the articles not examining the association between Type D personality and suicide (attempts)/suicidal ideation. Manual search of reference lists did not add any articles. All full texts were available.

3.2. Study characteristics

We identified eight studies (Table 1). Studies included general population samples and patient populations, with a wide age range. Seven studies reported on the association of Type D personality with suicidal ideation (Bunevicius et al., 2014; Ladwig et al., 2010; Michal et al., 2010; Park et al., 2014; van Dooren et al., 2016; Walters et al., 2018; Yoon et al., 2015), and two studies reported on its association with suicide attempt (Park et al., 2014; Yağci et al., 2018).

In all studies, the DS14 (Denollet, 2005) was used as a measure of Type D personality. The DS14 comprises a 7-item *negative affectivity* and a 7-item *social inhibition* subscale. Each item is scored on a 5-point Likert scale. Individuals who score ≥ 10 on both subscales are considered to have Type D personality (Denollet, 2005; Denollet et al., 2013). To assess suicidal ideation, different measures were used. Three studies used item 9 of the PHQ-9 (Kroenke et al., 2001) to find cases of suicidal ideation (Ladwig et al., 2010; Michal et al., 2010; van Dooren et al., 2016). By endorsing this item (ranging from 0 = “not at all” to 3 = “nearly every day”), individuals indicated the extent that they were bothered by thoughts of suicide over the last two weeks. Another two studies (Bunevicius et al., 2014; Walters et al., 2018) used item 9 of the BDI-II, by which cases of suicidal ideation were identified by a positive score (≥ 1) on item 9 (“suicidal thoughts or wishes”) of the Beck Depression Inventory (BDI-II, Beck et al., 1996). The Korean studies used the 19-item Scale for Suicide Ideation (SSI) (Beck et al., 1979), which offers a more refined assessment of the degree of suicidal thoughts and behavior over the last week (Park et al., 2014; Yoon et al., 2015). Attempted suicide was used as an indicator of suicidal behavior in two studies (Park et al., 2014; Yağci et al., 2018).

3.3. Why: suicidal thoughts and behaviors are associated with Type D

3.3.1. Studies reporting on type D and suicidal thoughts and behavior

In the community-based Gutenberg Health Study from the German general population, Type D personality was independently associated with a two-fold increased likelihood of suicidal ideation (OR = 1.98; 95%CI 1.49–2.63, $p < 0.0001$), even after adjustment for mental disorders including depression (Michal et al., 2010). Similarly, the KORA Augsburg F3 Study from the German population showed that Type D personality was associated with a significantly increased odds of suicidal ideation in both men (OR = 10.99; 95%CI 5.16–23.45) and women (OR = 4.04; 95%CI 2.47–6.63) (Ladwig et al., 2010).

In the community-based Maastricht Study (van Dooren et al., 2016), the frequency of suicidal thoughts was assessed in 712 respondents. In

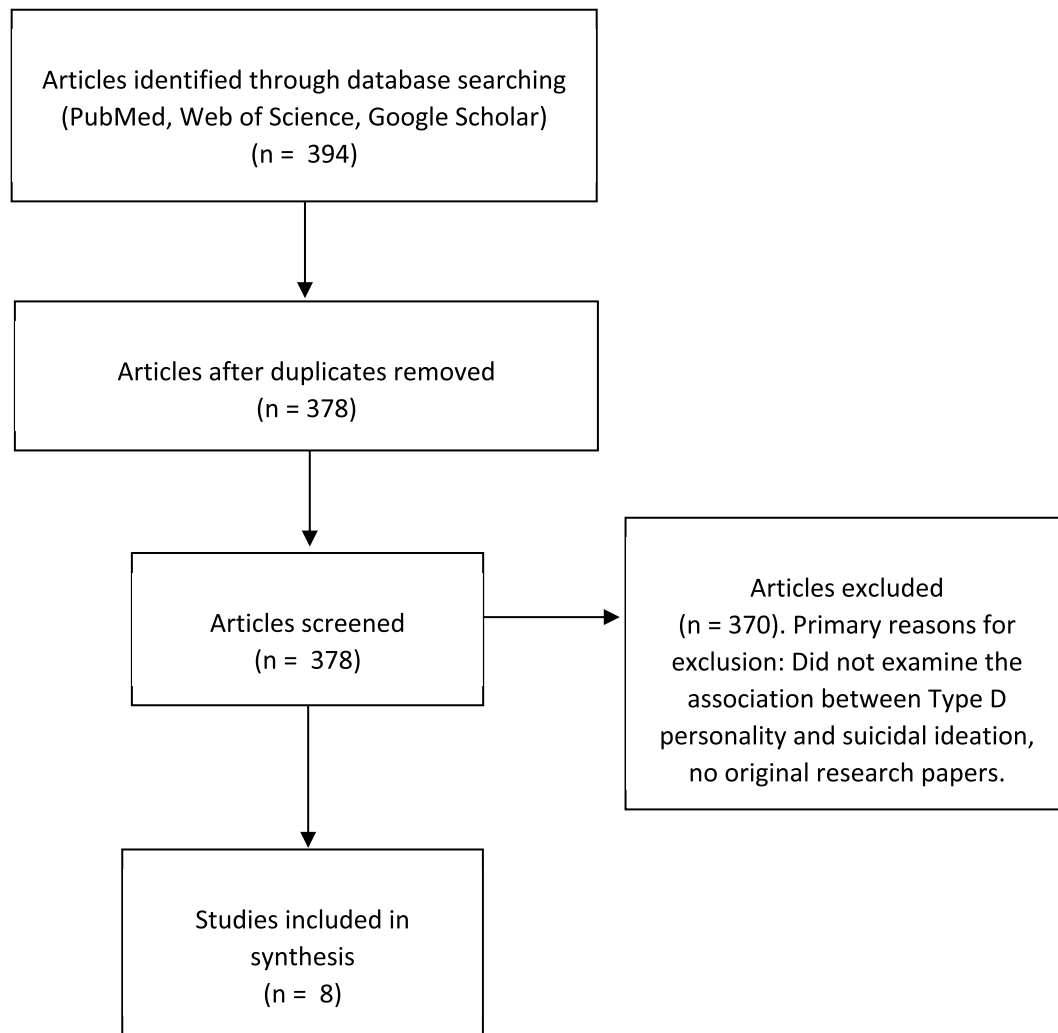


Fig. 1. Flow chart of study identification and selection.

Table 1
Overview of Studies that Examined the association of type D Personality with suicidal Thoughts and behaviors.

Author	Country	Population	Age	Suicidality	Measure	Type D personality Main findings
Michal et al., (2010) ^[18]	Germany	General population	35–74 years	Cases of suicidal ideation	Item 9 of PHQ-9	Type D was associated with a 2-fold increased prevalence of suicidal ideation (OR = 1.98, p < 0.0001), after adjustment for depression
Ladwig et al., (2010) ^[19]	Germany	General population	35–74 years	Cases of suicidal ideation	Item 9 of PHQ-9	Type D was associated with an OR = 10.99 for suicidal ideation in men, and an OR = 4.04 for suicidal ideation in women (both p < 0.001)
Yoon et al., (2015) ^[20]	South Korea	Low-income population	M = 49 ± 5 years	Degree of suicidal ideation	SSI total score	Level of suicidal ideation was 2 times higher in Type D individuals than in non-Type Ds, independent of socio-demographics (p < 0.001)
van Dooren et al., (2016) ^[21]	Netherlands	General population	M = 59 ± 8 years	Degree of suicidal ideation	Item 9 of PHQ-9	Type D individuals experienced higher levels of suicidal ideation than individuals with negative affectivity but no social inhibition (p < 0.001)
Bunevicius et al., (2014) ^[22]	Lithuania	Patients with coronary artery disease	M = 58 ± 9 years	Cases of suicidal ideation	Item 9 of BDI-II	Type D patients were more likely to display suicidal ideation than did patients with low scores on Type D traits (OR = 6.55, p = 0.001)
Walters et al., (2018) ^[23]	Australia	Patients with atrial fibrillation	M = 60 ± 9 years	Cases of suicidal ideation	Item 9 of BDI-II	Type D was associated with an increased prevalence of suicidal ideation in the multi-variable regression model (OR = 7.4, p = 0.001)
Yağci et al., (2018) ^[24]	Turkey	Patients from university hospital	M = 24 ± 7 years	Suicide attempt	Hospital admission; Interview	Type D was associated with suicide attempts in multivariable analysis (OR = 1.21, p = 0.034), while depression was no longer significant
Park et al., (2014) ^[25]	South Korea	Patients with depressive disorder	M = 40 ± 14 years	Degree of suicidal ideation; Suicide attempt	SSI total score; Interview	Type D was associated with more suicidal ideation (p = 0.004), and social inhibition with a history of suicide attempts (p = 0.033)

Note. BDI-II = Beck Depression Inventory-II; OR = Odds Ratio; PHQ-9 = 9-item Patient Health Questionnaire; SSI = Scale of Suicide Ideation.

this study, 17% of the respondents had Type D personality, while 12% had only negative affectivity but no social inhibition, and 71% scored low on both subscales. Respondents who were low in negative affectivity reported no suicidal thoughts at all. Type D individuals not only had higher levels of suicidal ideation than low-negative affectivity individuals ($p < 0.001$), but also experienced significantly more suicidal thoughts than did individuals with only negative affectivity but no social inhibition ($p < 0.001$) (van Dooren et al., 2016). Yoon and colleagues assessed Type D personality and suicidal ideation in 306 low-income, middle-aged adults from South-Korea (Yoon et al., 2015). Individuals with Type D personality had significantly increased levels of suicidal ideation as measured by the SSI, even after controlling for relevant socio-demographic variables. Specifically, both the negative affectivity and social inhibition components of Type D were independently associated with a higher degree of suicidal ideation (Yoon et al., 2015).

The link between Type D and suicidal ideation was also examined in two samples of patients with heart disease. In a study of 690 Lithuanian patients with coronary heart disease (Bunevicius et al., 2014), Type D personality remained independently associated with an increased odds of suicidal ideation (OR = 6.55, 95% CI 2.21–19.43, $p = 0.001$) after adjustment for age, gender, cardiac diagnosis, and disease severity (Bunevicius et al., 2014). Moreover, in a study of 78 Australian patients with atrial fibrillation, suicidal ideation was found in 20% of patients. Type D was associated with a significantly increased odds of suicidal ideation (OR = 7.4, $p = 0.001$), whereas age, sex, cardiac indices, and disease burden were not significant contributors.

Two studies examined the role of Type D in clinical samples of suicide attempters. In a Turkish case-control study (Yağci et al., 2018), 46 individuals admitted to a university hospital for a suicide attempt were compared to 45 individuals without a suicide attempt. Suicide attempters scored 5 and 3 points higher on respectively the negative affectivity and social inhibition components of Type D, as compared to non-attempters ($p < 0.001$). These differences were also clinically significant (Cohen's $d = 1.15$ and $d = 0.89$, respectively). Type D personality (OR = 1.21, 95%CI 1.014–1.450, $p = 0.034$) and childhood trauma were independently associated with suicide attempt; depression, anxiety, and impulsivity were not significant in the multiple regression model (Yağci et al., 2018). In a Korean study of 86 patients with major depressive disorder (Park et al., 2014), history of suicide attempt was assessed during a clinical interview, and degree of suicidal ideation was measured with the SSI. Depressed patients with a Type D personality experienced almost double the degree of suicidal ideation as compared to depressed patients without Type D (SSI = 13.8 ± 9.3 vs 7.2 ± 6.4 , $p = 0.004$). Suicide attempters also scored significantly higher on the social inhibition component of Type D (17.4 ± 6.9) than did non-suicide attempters within this sample of depressed patients (14.1 ± 6.9), $p = 0.033$.

3.4. Evaluating findings on Type D and suicidal thoughts and behavior

All reviewed studies used the same measure of Type D personality and multiple studies shared their assessment of suicidal ideation, which boosts confidence in the findings. These findings indicate a robust association between Type D personality and risk of suicidal ideation. A limitation is the cross-sectional nature of the studies. Prospective studies are needed to examine the predictive validity of Type D personality in future research. Most studies focused on suicidal ideation, and not on other indicators of suicidal thoughts and behavior. Nevertheless, it is important to address suicidal thoughts because they often progress to a suicide attempt (O'Connor and Nock, 2014).

Our review of Type D studies provided additional evidence over existing studies on the association between neuroticism and negative affectivity with suicidal ideation (e.g. Batty et al., 2018a; Cameron et al., 2017). Studies showed that the negative affectivity component of Type D was significantly associated with more suicidal ideation (Yoon et al., 2015) and an increased likelihood of suicide attempt (Loas et al., 2019;

Yağci et al., 2018). In addition, studies also highlight the potential role of social inhibition as a personality trait. Social inhibition was independently associated with a higher degree of suicidal ideation (Yoon et al., 2015), and suicide attempters displayed more social inhibition as compared to non-suicide attempters (Yağci et al., 2018). One study found that Type D individuals more frequently experienced suicidal thoughts as compared to individuals with only negative affectivity but no signs of social inhibition (van Dooren et al., 2016). Clearly, more research is needed to explore the role of social inhibition in suicidal tendencies.

The association of Type D personality with suicidal thoughts and behaviors was remarkably consistent across populations. Four community-based studies (Ladwig et al., 2010; Michal et al., 2010; van Dooren et al., 2016; Yoon et al., 2015) indicated that Type D individuals are more susceptible to suicidal thoughts. Two studies reported an increased prevalence of suicidal ideation in Type D patients with coronary artery disease (Bunevicius et al., 2014) and atrial fibrillation (Walters et al., 2018). In mental health populations, Type D personality may have additive value beyond depression, as it was related to more suicide attempts and suicidal ideation in patients with major depressive disorder (Park et al., 2014). Finally, we found that studies on the association of Type D personality with suicidal thoughts and behaviors yielded consistent findings across different cultures. This corroborates evidence that the characteristics of suicidal behavior are quite consistent across countries (O'Connor and Nock, 2014).

3.5. How: intrapsychic and interpersonal vulnerabilities of Type D

Little is known about the mechanisms that explain why certain personality characteristics confer greater risk for suicidal thoughts and behavior (Bi et al., 2017). Psychological theories may provide a framework to understand how different factors work together to increase this risk (O'Connor and Nock, 2014). The psychological framework of our current review builds on a theory-based model that suggests distinct intrapsychic and interpersonal vulnerabilities of individuals with Type D that may increase their susceptibility to proximal risk factors for suicidal tendencies (Figs. 2 and 3).

Stress-diathesis models presume that personality interacts with proximal stressors to result in an increased suicide risk (Hawton and van Heeringen, 2009; McGirr and Turecki, 2007). This implies that specific traits are only of relevance when acute stress occurs. In addition to presuming an interaction effect of Type D with acute stress in our current theoretical model, we take this proposition a step further by highlighting how Type D characteristics also contribute to the development and occurrence of mental disorders, and major stressors across the lifespan.

3.6. Vulnerability to emotional distress

Increased vulnerability to emotional distress is one pathway by which Type D contributes to suicide risk. Depressive disorder is the most common psychiatric disorder in suicide (Hawton and van Heeringen, 2009). In one of the studies on Type D personality, depressive disorder was associated with a 6-fold increased risk of suicidal ideation (Ladwig et al., 2010). The risk of suicidal thoughts and behaviors is also higher in other manifestations of chronic emotional distress. For example, chronic stressors, such as social or work stress have been associated with suicidal thinking (Loerbroks et al., 2016; Pettit et al., 2011; Rosiek et al., 2016).

By definition, people with a Type D (*Distressed*) personality have an increased vulnerability for depression, and other manifestations of mental distress (Fig. 2). In the community-based Gutenberg Health Study and Maastricht study, Type D individuals had an increased risk for clinically significant depression in cross-sectional (Michal et al., 2011; van Dooren et al., 2016), and prospective analyses (Beutel et al., 2018). Research in cardiac patients also indicates that Type D involves high vulnerability to mental distress (Bunevicius et al., 2014; Lambertus

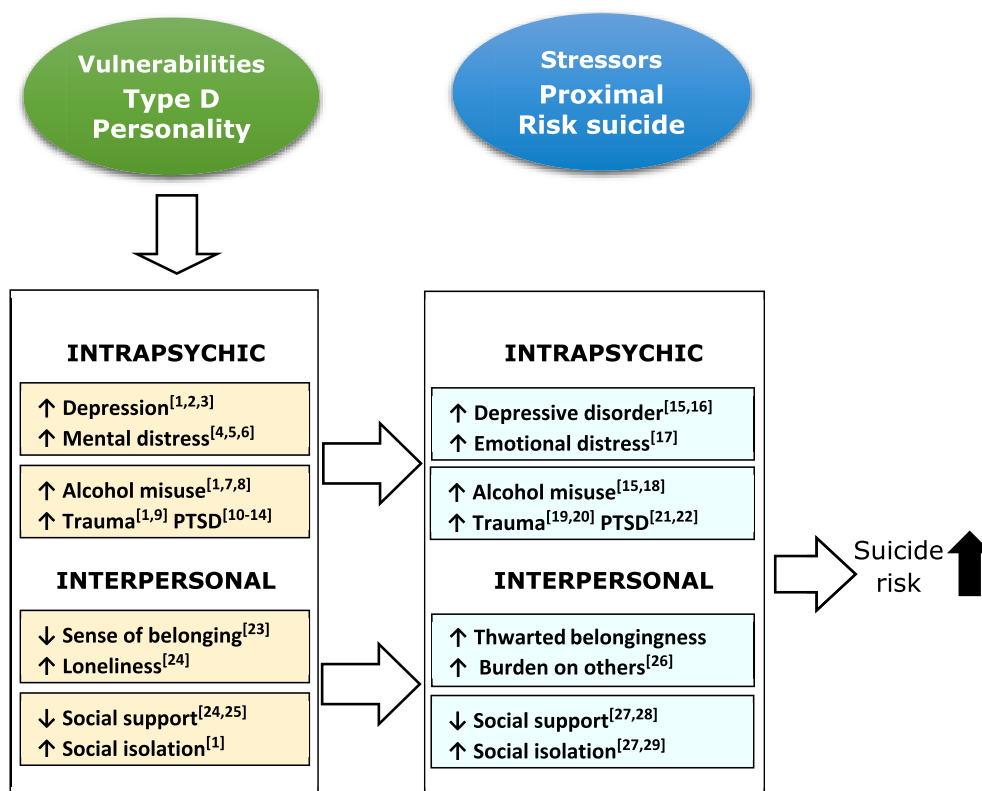


Fig. 2. Vulnerabilities associated with Type D that may increase suicide risk.

et al., 2018; Walters et al., 2018).

3.7. Vulnerability to life stress and posttraumatic stress

A second pathway involves the increased vulnerability to life stress and posttraumatic stress. Alcohol misuse and adverse, traumatic life events are major life stressors, and common risk factors in suicide (Hawton and van Heeringen, 2009; O'Connor and Nock, 2014). Childhood traumas, for example, have been related to an increased risk for suicide attempt (Yagci et al., 2018). Symptoms of posttraumatic stress were associated with suicide risk in a study of community dwelling veterans (McKinney et al., 2017). In another study, individuals with comorbid posttraumatic stress and social anxiety disorder had an increased risk of suicide attempts (McMillan et al., 2017).

Extant research shows Type D personality to be associated with these major life stressors. Type D individuals have an increased risk for alcohol misuse (Michal et al., 2011). In addition, Type D in the presence of early life trauma was related to increased alcohol use in women (van Montfort et al., 2018b). Type D individuals more often report a history of traumatic events (Michal et al., 2011), including emotional neglect/abuse during childhood (Demirci et al., 2016), and experience higher levels of posttraumatic stress (Cho and Kang, 2017; Habibovic et al., 2012; Kunst et al., 2011; Lukaschek et al., 2016; Mommersteeg et al., 2011), than do non-Type D individuals.

3.8. Vulnerability to interpersonal stress

In addition to intrapsychic characteristics, interpersonal Type D characteristics may also contribute to an increased suicide risk. The interpersonal theory of suicide posits that the interaction of thwarted belongingness and perceived burdensomeness leads to the development of suicidal ideation (Joiner et al., 2009). The importance of interpersonal factors is also supported by research showing that individuals who feel that they are socially well integrated may have lower risk for suicide

(Tsai et al., 2015). There is some evidence to suggest that Type D individuals are more likely to believe that they lack belonging or are a burden to others. In one study, the social inhibition component of Type D was related to a lower sense of belonging, and to more internalizing problems (de Moor et al., 2018). Another study showed that Type D was associated with more loneliness in patients with diabetes (Spek et al., 2019). More research on this topic is needed.

3.9. Vulnerability to social isolation

Social support has consistently been related to a lower risk of suicide (Batty et al., 2018b). For example, a study in undergraduate students suggests that perceived social support can decrease the suicide risk in at-risk individuals who are highly impulsive (Kleiman et al., 2012). Conversely, individuals who feel socially isolated may have an increased suicide risk (Batty et al., 2018b; Tsai et al., 2015). Individuals without Type D may have a better-established social support system as compared to individuals with a Type D personality. Research in adults with diabetes (Spek et al., 2019), and in healthy young adults (Williams et al., 2008) showed that Type D individuals reported lower levels of social support than non-Type D individuals. Type D was also robustly associated with feelings of social isolation in the general population (Michal et al., 2011).

Overall, the theoretical model of potential intrapsychic and interpersonal pathways from Type D to increased suicidal ideation and behavior (Fig. 2) supports the psychological plausibility of Type D personality as a distal risk factor for increased prevalence of suicidal thoughts and behaviors.

3.10. When: entrapment due to deficient coping styles of Type D

At present, we can only speculate on conceptual grounds when, i.e., under which conditions, Type D will contribute to an increased suicide risk. We presume that over time, recurrent dysfunctional problem

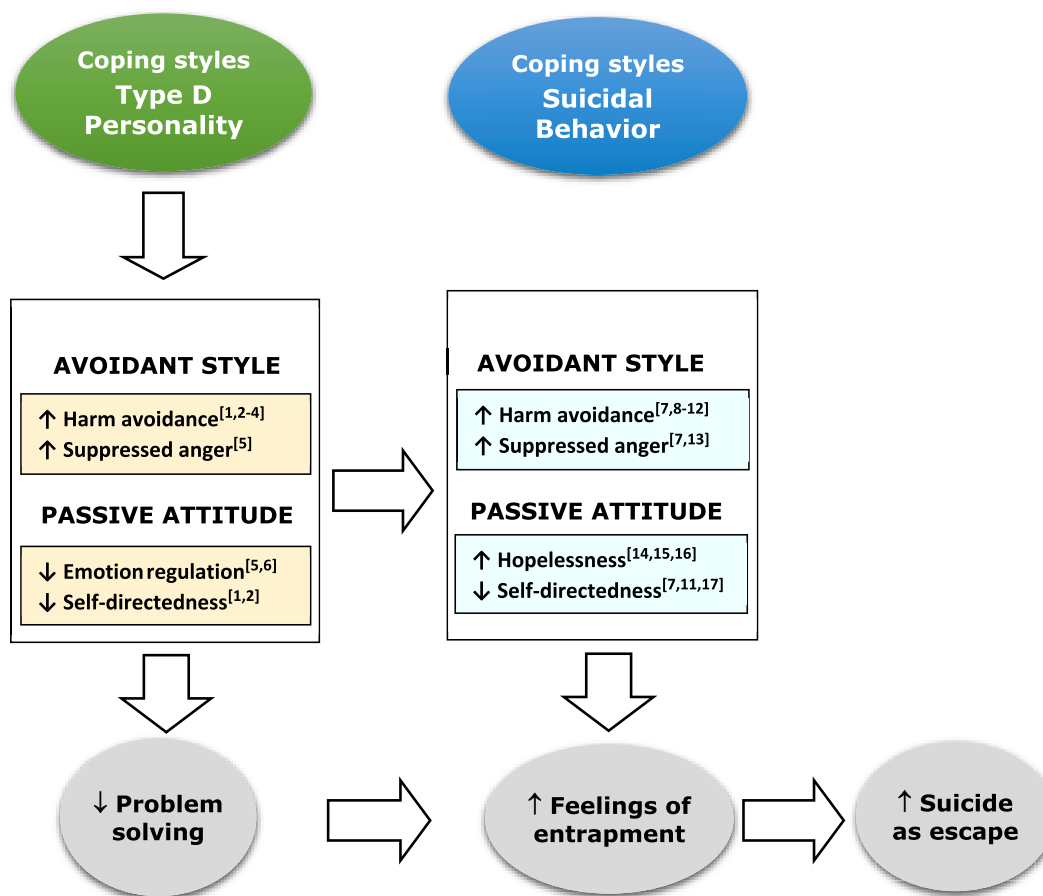


Fig. 3. Avoidant-passive disposition of Type D and feelings of entrapment.

solving and emotion regulation strategies may play a role in the transition from general psychological distress to more specific suicidal thoughts and behaviors in high-risk individuals with a Type D personality. People continually face interpersonal situations that require adaptive coping skills to achieve important goals such as emotional wellbeing, and connection with others. However, the avoidant coping style and passive attitude of some Type D individuals may have a profound effect on the way they manage to deal with these everyday challenges. According to the integrated motivational-volitional model of suicidal behavior (O'Connor and Kirtley, 2018), we theorize that, from a developmental perspective, high-risk Type D individuals with this *avoidant, passive attitude* are more vulnerable to the chain of *problem solving deficits* leading from recurrent perceptions of failure, and defeat through *feelings of entrapment* to, eventually, the emergence of suicidal thoughts driven by the *desire to escape* from chronic emotional, and social pain (Fig. 3).

3.11. Avoidant coping style

Avoidant attitude is a temperamental coping style characterized by a greater likelihood of giving in to avoid difficult situations, and a tendency to resign oneself to the situation (McAuliffe et al., 2006). Avoidant attitude is related to an increased risk of self-aggression, and suicide (Giegling et al., 2009; McAuliffe et al., 2006; McGirr et al., 2008; Perroud et al., 2013; Seguin et al., 2017; Su et al., 2018). Dispositional avoidance may also result in the tendency to inhibit anger expression in order to avoid negative reactions from others. Inwardly directed anger and inhibited aggression may predict self-aggression (Giegling et al., 2009). For example, internal hostility has been related to an increased suicide risk among community dwelling veterans (McKinney et al.,

2017).

Individuals with Type D personality are typically characterized by this avoidant coping disposition (Borkoles et al., 2018; Mommersteeg et al., 2011; Williams and Wingate, 2012; Zohar et al., 2011). Type D has been related to increased harm avoidance in Dutch military men (Mommersteeg et al., 2011), and in a community-based study of Israeli adults (Zohar et al., 2011). Similarly, Type D was associated with more avoidance coping, and lower levels of perceived coping effectiveness in athletes (Borkoles et al., 2018). Avoidance also mediated the adverse effect of Type D personality on the report of physical symptoms in young adults (Williams and Wingate, 2012), and more suppressed anger was experienced by patients with coronary artery disease characterized by Type D personality (Denollet et al., 2010). These findings indicate that Type D individuals may have a deficit in dispositional coping that impedes adequate problem solving and emotion regulation, hence increasing risk of suicidal ideation.

3.12. Passive attitude

Individuals with a passive attitude generate fewer effective alternatives to solve problems than individuals employing more active coping skills (Pollock and Williams, 2004), and tend to wait for someone else to solve their problem for them (Bilsen, 2018). This passive attitude is associated with an increased risk of suicidal thoughts and behaviors (Pollock and Williams, 2004), suicide attempt (Quinones et al., 2015), and completed suicide (Bilsen, 2018). Given their lack of initiative and dependency on others, people with a passive attitude are more susceptible to hopelessness as a suicide risk factor, when dealing with an accumulation of unresolved problems (Franklin et al., 2017). Importantly, this passive attitude echoes the character dimension of low

self-directedness. Lower levels of self-directedness have been related to more self-aggression (Giegling et al., 2009), an increased risk of suicide attempt in psychiatric patients (Perroud et al., 2013).

The above described passive-avoidance disposition is characteristic of Type D personality, and is closely related to deficits in emotion regulation (Denollet et al., 2010; Messerli-Burgy et al., 2012). Consistent with their passive attitude, evidence also suggests that the character dimension of self-directedness is decreased in Type D individuals (Mommersteeg et al., 2011; Zohar et al., 2011).

3.13. Deficits in problem-solving

From a life-span perspective, a passive-avoidant style tends to become increasingly salient for suicidal thoughts and behaviors with increasing age (Turecki and Brent, 2016). Arguably, this style results in deficits in problem-solving or deficits in emotion regulation across time and situations. Deficits in interpersonal problem-solving in particular play a key role in suicidal behavior (Dieserud et al., 2001). Because people with Type D personality often turn to passivity-avoidance as a habitual response to problems, they are likely to experience difficulties with problem-solving, and interpersonal problem-solving in particular. Type D individuals display intensified stress responses in social situations (Bibbey et al., 2015), and have a cognitive interpretation bias toward interpersonal threat (Grynberg et al., 2012). The heightened interpersonal sensitivity implicated in the social inhibition component of Type D further increases the likelihood that they feel rejected or excluded (Denollet, 2013). Heightened interpersonal sensitivity mediated the adverse effect of peer victimization on suicidal ideation in adolescents with psychiatric disorder (Williams et al., 2017). In suicide attempters, perceived social exclusion has been related to sustained dysfunctions in brain regions implicated in pain tolerance and social cognition (Olie et al., 2017).

Type D individuals are less likely to be persuaded to do something because it is consistent with their beliefs; rather, they are more susceptible to the ‘other-oriented’ strategy of doing something in order to obey others, and go along with a crowd (Wall et al., 2019). In addition, they are unlikely to express their concerns to other people despite the fact that they remain preoccupied with negative affect (Shanmugashegaram et al., 2014), resulting in suppressed anger (Denollet et al., 2010) and anger rumination (Lin et al., 2017). Arguably, all of these processes may contribute to persistent deficiencies in interpersonal problem solving.

3.14. Entrapment as motivational factor

Over time, avoidant-passive coping and recurrent interpersonal problems may fuel feelings of defeat in Type D individuals. Sensitivity to signals of defeat is increased by negative affect and socially prescribed perfectionism (O'Connor and Kirtley, 2018), and is closely related to feeling rejected as a precipitant of suicidal distress (Olie et al., 2017; Turecki and Brent, 2016; Williams et al., 2017). Given their preoccupation with negative affect (van Dooren et al., 2016), perfectionism (Shanmugashegaram et al., 2014), and rejection (Denollet, 2013), Type D individuals frequently experience signals of defeat. Most Type D individuals may come to terms with interpersonal stress and defeat in their lives. In other, more vulnerable Type D individuals, however, passivity and inability to escape from defeating interpersonal circumstances may result in feelings of entrapment (Gilbert and Allan, 1998; Taylor et al., 2011). Entrapment is a key motivational factor that drives the formation of suicidal ideation as the final pathway to escape (O'Connor and Kirtley, 2018), and is robustly related to suicidal thoughts and behaviors (Gilbert and Allan, 1998; Li et al., 2018; O'Connor and Kirtley, 2018; Panagioti et al., 2012; Siddaway et al., 2015; Taylor et al., 2011), including repeat suicidal attempt (O'Connor et al., 2013). Although this is a speculative point, we presume that a growing feeling of entrapment provokes the emergence of suicidal behavior as an escape among

vulnerable Type D individuals.

4. Discussion: directions for clinical research and practice

The etiology of suicidal behavior is very heterogeneous, and is variably associated with different suicide risk factors (Turecki and Brent, 2016) that some have argued could best be studied in concert, i.e. as a composite risk score or latent profile (Franklin et al., 2017; Randall et al., 2019). Others have argued that there is a need to consider the role of specific, understudied factors contributing to suicidal distress, such as Type D personality (Michal et al., 2010). Empirical evidence supports the hypothesized link between Type D personality and suicidal thoughts and behavior, and our conceptual models of the development of vulnerabilities and the transition to suicidal distress further substantiate the plausibility of this link. However, what does the Type D personality construct have to offer for clinical research and practice? To address this issue, we will discuss here the clinical relevance and implications of Type D research (Table 2).

4.1. Type D and early risk detection

Suicide researchers have advocated the use of new strategies for early risk detection (Ladwig et al., 2010), such as the early identification of subgroups of people at risk (Nock et al., 2019). For example, a recent study used latent class analysis to identify subgroups with suicidal distress, based on psychiatric diagnosis, psychotropic medication use, childhood abuse, and acute stressors (Randall et al., 2019). Their results suggest that it is a difficult task to stratify individuals into distinct risk subgroups reliably. Research on Type D personality, however, builds on a person-centered approach (van Montfort et al., 2018a) to suggest that the joint tendency toward negative affectivity and social inhibition characterizes a distinct risk profile. Studies that used latent class analysis to distinguish personality subgroups were able to identify a clear, distinct Type D profile (van Montfort et al., 2018a; Wall et al., 2019). Hence, inclusion of Type D in future suicide research answers the call for more data on high-risk subgroups (Nock et al., 2019), and for more data on personality in particular (Bi et al., 2017).

4.2. Pathways and drivers associated with Type D

Our pathway models clearly indicate that Type D personality may serve as a basic vulnerability that predates the onset of proximal risk factors. Most diathesis–stress models posit that the effect of distal risk factors is especially pronounced when activated by stress (O'Connor and Nock, 2014). However, our conceptual approach suggests that Type D also contributes directly to the onset of proximal risk factors. Others indeed have argued that the elucidation of personality characteristics as stable risk factors predating the onset of psychopathology may improve the detection of increased suicide risk (McGirr and Turecki, 2007). Type D is such a predisposing factor that needs consideration when investigating psychological processes that lead to the emergence of proximal risk factors, and, eventually, suicidal tendencies. In contrast to

Table 2

Type D and suicidality: Relevance and implications.

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- | |
|---|
| (a) Empirical evidence |
| ● Indicates a robust link between Type D and suicidal ideation |
| ● Confirms the key role of personality as vulnerability factor |
| (b) Theoretical models |
| ● Provide a conceptual framework of psychological pathways |
| ● Suggest that Type D is related to defeat and entrapment |
| (c) Clinical implications |
| ● Include screening for Type D personality traits with the DS14 |
| ● Highlight the role of social inhibition, in addition to disinhibition |
| (d) Therapeutic considerations |
| ● Indicate reducing emotional distress in Type D individuals |
| ● Suggest that fostering effective coping skills offers promise |
-

consistent evidence pointing at Type D personality as distal risk factor, it is uncertain whether Type D contributes to the *transition* from emotional distress to suicidal thoughts and behavior. We need to improve our understanding of factors that drive this transition from general distress to suicide distress. We speculated that the avoidant-passive disposition of Type D may fuel feelings of entrapment as a driver of suicidal behavior. Yet, research still needs to examine this proposition (Gilbert and Allan, 1998; Li et al., 2018; O'Connor and Kirtley, 2018; Panagiotti et al., 2012; Siddaway et al., 2015; Taylor et al., 2011).

Type D and social inhibition: added value to depression and impulsivity.

The empirical evidence and theoretical models presented in this review warrant the assessment of Type D as risk factor for suicidal behavior in clinical research and practice. Depression is the most common psychiatric disorder in suicide (Hawton and van Heeringen, 2009), but perceived entrapment is related to an increased risk for suicidal thoughts and behavior, independent of depression (Taylor et al., 2011), and suicidal ideation also occurs in the absence of depression (Batterham et al., 2019). Of note, one study found that patients diagnosed with major depressive disorder and additionally characterized by Type D personality, were more vulnerable to suicidal ideation as compared to depressed patients without Type D, even when the severity of depression is identical (Park et al., 2014). Moreover, Type D involves high vulnerability to depression, and has been shown to predict the new onset of depression (Beutel et al., 2018). Hence, we would advocate assessment of Type D, in addition to depression and other psychological risk factors.

Type D research provides new information on distal risk factors by showing that not only disinhibition but also social inhibition, as an opposite disposition, may be related to suicidal thoughts and behavior. Disinhibition/impulsivity increases suicide risk among a subset of high-risk individuals (Bi et al., 2010; Giegling et al., 2009; McGirr and Turecki, 2007; Millner et al., 2019; Witte et al., 2018; Yen et al., 2009); yet, impulsivity is not always related to suicide (McGirr and Turecki, 2007; Millner et al., 2019), and meta-analytic studies suggest that the relationship between impulsivity and suicidal behavior is small (Anestis et al., 2014; Witte et al., 2018). Findings from Type D studies suggest that social inhibition may be associated with suicidal ideation (Yoon et al., 2015), and suicide attempt (Park et al., 2014; Yağci et al., 2018). Introversion (Roy, 2003; Su et al., 2018; Turecki and Brent, 2016), but also extraversion (DeShong et al., 2015), have been associated with an increased suicide risk. Although social inhibition partly overlaps with the construct introversion, there is a clear distinction as well. Social inhibition involves more social alienation (de Moor et al., 2018), social-evaluative concerns (Denollet, 2013), and social withdrawal (Denollet and Duijndam, 2019) than does introversion. Social inhibition is related to susceptibility for internalizing problems (de Moor et al., 2018), emotional preoccupation (Shanmugasaram et al., 2014), and anger rumination (Lin et al., 2017). However, while externalizing behaviors such as impulsivity are readily observable, the emotional distress of inhibited individuals may go unnoticed because they are quiet on the surface. Screening with the DS14 (Denollet, 2005) or SIQ15 (Denollet and Duijndam, 2019) may be useful to identify socially inhibited individuals in clinical practice.

4.3. Reducing distress and enhancing coping in Type D individuals

Type D is relatively stable over time, which may for the majority be explained by stable genetic factors (Kupper et al., 2011; Li-Gao et al., 2020). However, evidence suggests that behavioral intervention can reduce the level of emotional distress associated with Type D personality (Herrmann-Lingen et al., 2016; Karlsson et al., 2007; Nyklicek et al., 2013). For example, mindfulness-based stress intervention significantly reduced the level of negative affectivity and social inhibition among distressed individuals from the general Dutch population (Nyklicek et al., 2013). Clinical trials have also showed that expressive writing

may improve quality of life after myocardial infarction in patients with a Type D personality (Hevey et al., 2012), and may attenuate the adverse emotional effects of Type D in the general population (Smith et al., 2018).

Specifically, Acceptance and Commitment Therapy (ACT) may be effective in reducing suicidal ideation (Ducasse et al., 2018). ACT fosters acceptance of the present reality, and may thereby help to reduce avoidant tendencies and the desire to escape (Tighe et al., 2018). Via its focus on the exploration of personal values, ACT may help to reduce suicidal risk factors such as problematic goal engagement (O'Connor et al., 2009; O'Connor and Nock, 2014), and lack of perceived reasons for living (Malone et al., 2000; O'Connor and Nock, 2014). Enhancing self-compassion (Gilbert, 2014) should also be considered as a way to promote adaptive emotion regulation (Trompeter et al., 2017) and mental health (Sommers-Spijkerman et al., 2018) among high-risk Type D individuals. Compassion-Focused Therapy (CFT) was developed for individuals with high levels of self-directed hostility or self-criticism, and negative affect arising from interpersonal situations. Theoretical models underlying CFT suggest that feelings of defeat and entrapment are a direct consequence of the use of passive-avoidant coping strategies (Braehler et al., 2013; Gilbert, 2009). Although these strategies may reduce perceived interpersonal threat in the short term, they increase perceived threat, and reduce well-being in the long term. CFT assumes that passive-avoidant strategies are caused and maintained by underlying, problematic ways of relating to oneself and others. As an alternative, CFT fosters positive connectedness to oneself and others (Gilbert, 2009, 2014). No studies have investigated CFT for the treatment of Type D individuals or individuals at risk for suicide.

5. Limitations, strengths and conclusion

Some limitations and strengths to the reviewed literature should be noted. So far, only eight studies have explored the association between Type D personality and suicidal ideation or attempts, and all of those were cross-sectional studies. In cross-sectional studies, the stress-diathesis-outcome triad cannot be separated. More studies in diverse populations, as well as prospective studies are needed to examine the predictive validity of Type D personality in future research on suicide risk. Another limitation is that the intrapsychic and interpersonal mechanisms proposed in the current study have not been examined in association with Type D in the context of suicide research. Especially the 'when', i.e. our proposition of the conditions under which Type D personality may contribute to suicidal thoughts and behaviors, is primarily theoretical, and not substantiated by empirical studies that simultaneously assessed Type D personality as well as the proposed mechanisms in the context of suicidal thoughts and behaviors. This may be a first step future research needs to take. At the same time, we find that our proposed theoretical models are the primary strength of this article. We find that we provided well-substantiated hypotheses, albeit indirectly supported in cases that can offer concrete guidance for future empirical study on this topic.

Our understanding of when, why, and among whom suicidal thoughts and behaviors unfold is incomplete (Nock et al., 2019; Randall et al., 2019). We discussed empirical evidence, theoretical pathways, and clinical considerations regarding Type D personality as a dispositional vulnerability for the emergence of suicidal thoughts and behaviors. Our review supports the proposition of Michal et al. (2010) that the contribution of Type D as an understudied but presumably important risk factor for suicide needs further investigation. Research on intrapsychic and interpersonal vulnerabilities substantiates the psychological plausibility of this increased risk in Type D individuals. Hence, according to the stress-diathesis model (Hawton and van Heeringen, 2009; O'Connor and Nock, 2014), Type D personality represents a general vulnerability for suicidal thoughts and behaviors, and assessing Type D personality along with proximal stressors may be useful to evaluate the risk of suicidal thoughts and behavior.

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Declaration of competing interest

None.

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