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Perceived Control as a Potential Protective Factor for Suicidal Thoughts and Behaviors in Cancer Patients and Survivors: A Systematic Review With Meta-Analysis

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ABSTRACT

Objective: Individuals affected by cancer have an elevated risk of experiencing suicidal crises. Aligning established suicide theories with social-cognitive theories, perceived control and related constructs emerge as potential protective factors for suicidal thoughts and behaviors in cancer patients. As perceived control is potentially modifiable, it holds great potential for prevention and intervention efforts. We aimed to comprehensively synthesize the evidence on perceived control and its link with suicidal thoughts and behaviors in cancer patients.

Methods: The search term and procedures were registered in PROSPERO (CRD42023391048). We systematically searched the databases PubMed/MEDLINE, CINAHL, PsycInfo, Web-of-Science Core Collection, Cochrane Library, adding a grey literature search. In addition to the narrative review, pooled effect sizes, moderation and subgroup analysis were calculated.

Results: The systematic search yielded 1986 original reports of which 36 were included in the systematic review and 25 in the meta-analysis. Demoralization, help-/hopelessness, and self-efficacy were the most commonly studied facets of control, showing a relatively large, pooled correlation with suicidal ideation overall ($r = 0.45$, [95% CI = 0.38–0.52], $Q = 346.15$, $p < 0.01$, $I^2 = 91.2\%$) and across operationalisations (demoralisation: $r = .52$; hopelessness: $r = .45$; self-efficacy: $r = 0.40$). Moderation analyses revealed no effect of cancer stages; but more directly cancer-associated variables (demoralisation, hopelessness) were more closely related to suicidal ideation ($Q_M = 5.40$, $p = 0.02$) than general self-efficacy.

Conclusion: The findings underscore the pivotal role of perceived control in shaping severe distress in cancer patients. More studies are needed examining perceived control in a narrower sense.

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1 | Background

Cancer is not just a burden on physical health but can also impose significant challenges on individuals' mental well-being. Up to 40% of persons affected by cancer report clinically relevant mental distress [1, 2], with up to two out of 10 experiencing suicidal ideation [3]. Compared to the general population, those with cancer face an up to fourfold increased risk of death by suicide [4]. While cancer itself was identified as a consistent risk factor for suicide in a recent umbrella review [5], the prevalence of suicidal ideation (0.7%–46.3%) [6] as well as of deaths by suicide (0.028%–0.204%) [7] varies greatly within this population. Hence, an understanding of the factors that shape cancer patients' and survivors' vulnerability to suicidal thoughts and behaviors (STBs) is of paramount importance. While both the disease and its treatment can have depressogenic effects, there is a consensus that neither mental distress in general nor depression symptoms in particular are sufficient in explaining the elevated risk of STBs in those with cancer [8, 9]. Rather, STBs are increasingly viewed as a distinct clinical entity shaped by a complex interaction of biopsychosocial risk and protective factors [10].

For example, the Three-Step Theory by Klonsky and May [11] (3ST) highlights the role of hopelessness in the emergence of suicidal thoughts; as they posit that STBs emerge from the combination of mental pain and hopelessness. The Interpersonal Theory of Suicide (IPT) postulates a quite similar framework. Here the risk of developing suicidal ideation is heightened in case an individual experiences the following states: feeling as a burden (“perceived burdensomeness”), perceiving themselves as disconnected from others (“thwarted belongingness”) AND feeling hopeless about these states [12]. Previous research has addressed these aspects, but with different emphases [13]: Social support has been demonstrated to be a general crucial protective factor for STBs [14] and feelings of hope and hopelessness have been found to be an important individual factor associated with STBs (in persons affected by cancer) [12, 15, 16]. However, cognitive aspects of the Interpersonal Theory of Suicide have received less attention in the oncological context; in the sense that holding on to hope can be equated to still perceiving a sense of control to facilitate the adverse situation. Multiple theories converge in highlighting such a conviction as crucial in protecting against suicidal ideation, particularly within persons affected by cancer who are confronted with a loss of agency and functioning.

In particular, the Integrated Motivational-Volitional Model of Suicide [17] (IMV) also emphasizes the key role of perceived control in the development of suicidal ideation. According to this framework, the emergence of suicidal ideation can be traced back to a cognitive narrowing coined entrapment (e.g., perceived control), which arises when individuals feel defeated and/or humiliated and, at the same time, lack sufficient coping strategies to surmount their circumstances.

Perceived control (and similar constructs) thus plays a central role in the major theories of suicide. Against this background, from the perspective of clinical practice, an in-depth understanding of perceived control and its function is a relevant target as it is potentially modifiable by psychosocial interventions [9].

The particular role of *perceived control* has further been identified in qualitative studies, where the experience of cancer as a loss of control [18, 19] has been described as exacerbating the psychological impact of the disease. Perceived control, in a narrow sense, describes the individual conviction that one can adapt and change the environment to one's own goals and desires (i.e., primary control), as well as adapting one's own inner experiences, goals and desires to the circumstances of the environment (i.e., secondary control) [20, 21]. Rothbaum's conceptualization [20] of primary and secondary control holds the potential to elucidate the mental processes at play when confronted with a potentially life-threatening illness: The attainment of primary control becomes notably challenging as environmental factors, particularly the diagnosis of cancer itself, cannot be easily modified to align with one's needs (such as the restoration of health). Therefore, it can be assumed that secondary control plays a pivotal role in ameliorating psychological distress, that is, that it acts on the link between the disease itself and the emergence of STBs. However, both strategies (i.e., perceived control) seem to act as psychological resources during challenging times, buffering the negative consequences of stress and uncertainty [20–22].

Along these lines, it is crucial to address the pitfalls of jingle-jangle fallacies, as the construct of perceived control is affected by them: The jingle fallacy refers to the incorrect assumption that the same label solely incorporates equivalent concepts or measures, while the jangle fallacy pertains to the incorrect assumption that concepts are distinct when they have different labels. In the context of perceived control, the literature shows a great range of closely associated constructs, such as a sense of autonomy, mastery, agency, self-efficacy, and help- and hopelessness [23]. Skinner [23] found over 100 terms related to perceived control. Thus, using the term *control* without considering its nuances can lead to inconsistencies, biased and confounding effects. The presence of jingle-jangle fallacies necessitates a rigorous examination of the conceptual and operational definitions of perceived control to ensure meaningful and valid conclusions.

In the context of cancer, different operationalizations are relevant. While self-efficacy—defined as believing in the individual competencies to master specific situations [21]—is a rather broad and stable concept linked to perceived control, there are also concepts that are more specifically linked to the context of cancer: hopelessness and demoralization. Hopelessness is defined as having negative future outcome expectancies [24]. Hope or its absence (i.e., hopelessness) is an established concept in the context of cancer with a prevalence rate of around 20% [15]. Previous studies have shown that hopelessness is significantly associated with psychological distress in individuals affected by cancer [16]. Demoralization, on the other hand, is closely linked to the context of stressful situations, such as a terminal illness. It is defined by a range of symptoms, such as perceived lack of control and uncertainty [25]. Demoralization is quite common within cancer patients, with around 13%–18% showing clinically relevant demoralization [26], and also associated with adverse mental health outcomes [16].

Although all aforementioned concepts are united by the cognitive component of perceived control and their associations

with mental well-being as well as suicidal ideation in individuals with cancer are intuitive, there are no systematic, quantitative syntheses on the specific impact perceived control and related constructs have on STBs in those with cancer.

To address the outlined research gap, we conducted a systematic review with meta-analysis. The aim was to comprehensively explore and summarize the existing literature on the facets of perceived control and their associations with STBs in those affected by cancer. We sought to provide a clearer assessment of the hypothesized protective effect of perceived control as well as closely related constructs on STBs. We pursued the following specific research questions:

- A. To what extent has the association between perceived control and STBs been studied to date in individuals with cancer?
- B. What is the overall effect size and direction of this association?
- C. Do different conceptions of perceived control differ in their association with STBs?

2 | Methods

2.1 | Search Strategy, Inclusion and Exclusion Criteria

This study was conducted in line with the latest PRISMA guidelines [27]. Before the main search, the search strategy, in- and exclusion criteria and methods of synthesis were registered in PROSPERO (CRD42023391048). Further relevant details from the registration are described in the following. To identify all relevant articles through our systematic search, we used the PICO framework [28] to define the relevant aspects. No restrictions were made regarding the age or language of the studies. The in- and exclusion criteria were as follows:

- *Participants*: Eligible samples comprised the adult population (> 18 years) of individuals affected by cancer (including all stages of disease and survivorship). No restrictions were made regarding the cancer entity or study setting.
- *Operationalization Perceived Control*: As (perceived) control is a construct affected by the aforementioned jingle-jangle fallacies, we explicitly aimed to obtain data from a wide range of different operationalizations and conceptualizations. Respective designations were assessed for eligibility following Skinner's list of 100 terms of control [23] as well as in consideration of the summary of the last 50 years of research on perceived control [29]. In addition, we reviewed potentially useful MeSh terms and associated original research articles to see if they led to studies that examined related constructs. Finally, constructs closely tied to the psycho-oncological context, which included perceived control, but also other aspects, were discussed with senior project members who were clinicians, researchers, and scientist-practitioners. In the case of demoralization, for instance, we ultimately decided in

favour of its inclusion. The diverging approaches to control in the different studies were addressed by subgroup analyses.

- *Operationalization Suicidal Thoughts and Behaviors*: Eligible were the full range of STBs, from passive death wishes to suicide deaths. For a differentiation and explanation of terms, see Silvermann et al. [30]. As we conceived end-of-life decisions and assisted dying as a construct distinct from a suicidal crisis, respective studies were excluded from the systematic analysis and meta-analysis.
- *Study Type*: Eligible were all original studies reporting quantitative data regarding the relationship between any perceived control construct and STBs in individuals with cancer and cancer survivors. Case reports, review papers, comments, and opinion papers not reporting original data or not containing quantitative data relevant to the research question were excluded. However, they were used as additional sources during citation/hand searching.

2.2 | Information Sources

The first cut-off date of the systematic search was January 17, 2023. It was updated on November 23, 2023 and yielded the additional inclusion of one article. No restrictions were placed on how old the included studies could be. The search included the following databases: PubMed, Cochrane Library/Cochrane Central Register of Controlled Trials, Web of Science Core Collection, CINAHL, and APA PsycInfo. We supplemented a grey literature search by reviewing the literature section of relevant articles and we screened the first 100 hits from a Google Scholar search (including preprints). The search term is provided via the Open Science Framework: https://osf.io/57fb4/?view_only=672581dd58734264af62f41548e18e9e. It spells out variations of assessing STBs (e.g., suicidal ideation), constructs related to perceived control (e.g., hopelessness), and specifiers of the population of interest (e.g., leukaemia).

2.3 | Study Selection

After removing the duplicates following the guidelines by Bramer et al. [31], we screened study abstracts and titles and excluded articles that did not fit the inclusion criteria. The remaining articles' full texts were screened for eligibility by two project members independently (J.H., T.S.). Inter-rater reliability (Cohen's κ) was calculated to ascertain the raters' agreement. In case of non-concordance, the in- or exclusion of the articles was decided involving a senior project member (M.E.).

2.4 | Data Collection

The following data was extracted: (a) authors, (b) title, (c) year of publication, (d) country/region, (e) study design (e.g., cross-sectional, longitudinal), (f) setting (e.g., inpatient, outpatient, counselling patients), (g) population (e.g., cancer patients, cancer survivors), (h) sample size, (i) age of the population

(Range, Mean, Standard Deviation), (j) sex/gender proportions (% female), (k) cancer entity, (l) stage of cancer; (m) studied STBs, (n) measurement of STBs, (o) prevalence of STBs, (p) designation of perceived control construct, (q) measurement of perceived control construct, (r) effect size of referred association, if available, (s) other data on the studied constructs that could be used to calculate the desired effect size (e.g., summary values).

2.5 | Risk of Bias Rating

The risk of bias rating (as low, some concerns, high or very high concerns) was conducted using the ROBINS-E tool. The following domains were rated: (a) confounding, (b) measurement of the exposure (here: perceived control), (c) selection of participants into the study (or into analysis), (d) post-exposure interventions, (e) missing data, (f) measurement of outcomes (here: STBs), (g) selection of the reported results.

2.6 | Methods of Synthesis and Statistical Analysis

Analyses were conducted using R 4.3.1 [32] and the metafor package 4.2-0 [33]. The data were analysed with a random effects model (REM) using z -transformed correlation coefficients. In the case of data dependency, the data was aggregated by group (aggregate.escalc function, metafor package) [33] with consideration of the ICC (rho) [34]. As proposed by Gignac and Szodorai [35], correlations of 0.10, 0.20, and 0.30 were interpreted as relatively small, typical, and relatively large. For all

analyses, a 95%-confidence interval (CI) was calculated, and results were displayed in forest plots. An exploratory analysis was implemented to determine potential subgroups. This was done in two steps. Firstly, subgroups were formed based on similarly named *perceived control* outcomes, (e.g., self-efficacy). Secondly, the difference between these groups was estimated using a subgroup-analysis. Third, we conducted additional moderation analyses to examine whether (1) the reported cancer stage (all stages vs. palliative stages) or (2) the implemented constructs (stable [general self-efficacy] vs. more specific measurements [i.e., hopelessness, demoralization, health self-efficacy]) had a moderating effect on the relationship between perceived control and suicidal ideation.

Finally, to determine the robustness of results to study outliers, sensitivity analyses were implemented using a range of indicators, in particular: DFFITS (difference in fits) values, Cook's distances, covariance ratios, and DFBETAS (difference in beta values).

3 | Results

3.1 | Selection and Characteristics of Studies

The search and screening process is illustrated in Figure 1 with the systematic and supplemental search yielding 1986 articles in total. After the removal of duplicates, 1373 original studies' titles and abstracts were screened. Finally, 88 were assessed for eligibility. The inter-rater reliability of the full-text screening was $\kappa = 0.901$, indicating an almost perfect agreement [36]. To

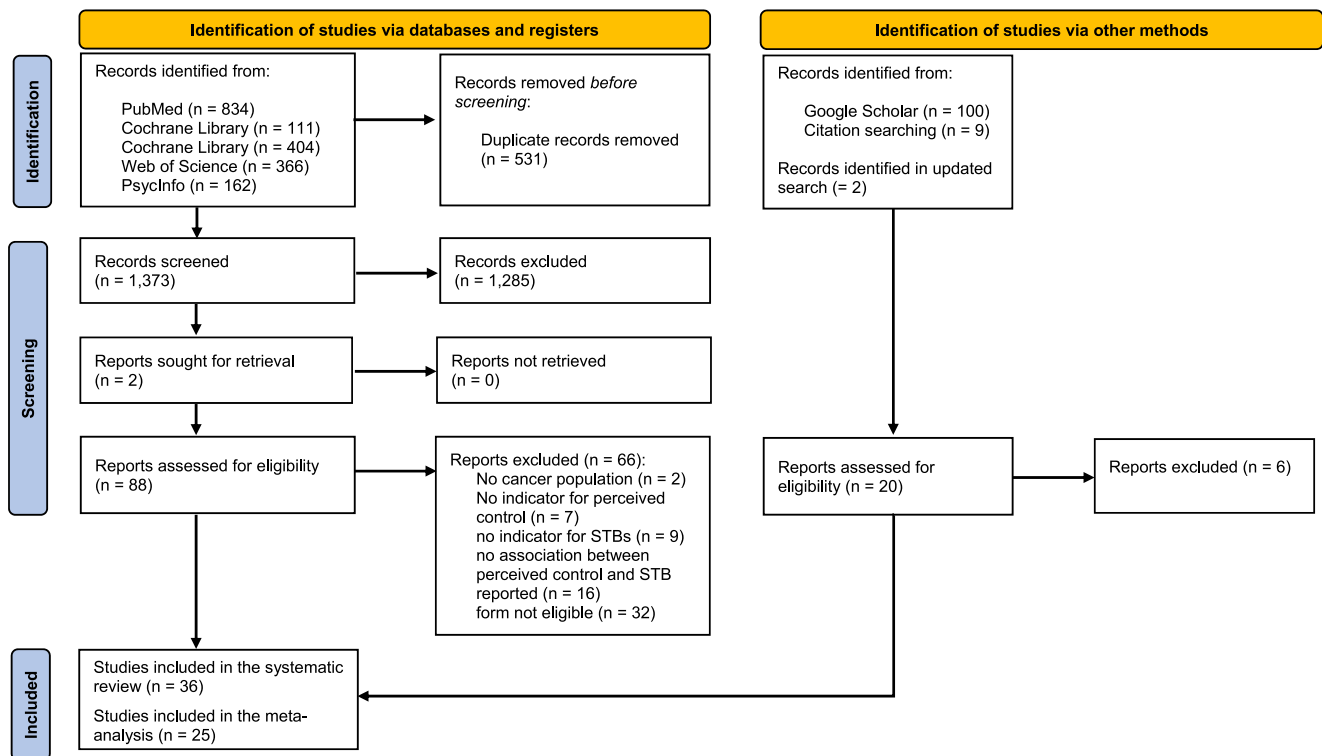


FIGURE 1 | PRISMA 2020 Flow-Chart of the search and screening process. The figure shows the in- and exclusion of records in accordance with the single steps of Identification and Screening based on Page et al. [22] PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

obtain all original articles for the full-text screening, two were retrieved via interlibrary loan. Out of 88 reports, 66 were excluded. Ultimately, 14 articles were included identified from grey literature and the updating search. For a detailed breakdown of the reasons for exclusion, please see Figure 1. Eventually, 36 articles met the study's eligibility criteria to be included in the systematic review. In the meta-analysis, 25 articles could be included.

3.2 | Characteristics of Included Studies

The 36 eligible articles are summarized in Table 1. Most studies were conducted in Asia ($n = 15$), followed by North America ($n = 10$) and Europe ($n = 9$). Overall, they comprised 9842 participants with a mean age of 57.39 ($SD = 7.10$). Regarding the cancer stage, 11 studies (30.56%) investigated advanced cancer, while the other articles did not explicitly focus/report on a certain cancer stage. Most studies ($n = 30$, 83.33%) did not concentrate on a single specific cancer entity but rather included a wide range of diagnoses. Three articles (8.33%) focused solely on breast cancer [46–48], and one article each on stomach, ovarian and oral cancer (each 2.78%) [49–51].

The most commonly examined conceptualization of perceived control was help-/hopelessness ($n = 15$, 41.67%), followed by demoralization ($n = 11$, 30.56%), and self-efficacy ($n = 8$, 22.22%). Additionally, one study each investigated the loss of control [52] and control over life [53]. We could locate no original study that investigated perceived control (incl. primary and secondary control) as defined by Rothbaum et al. [20]. Different instruments were used to capture the respective sub-constructs, with the *Beck Hopelessness Scale* (BHS) [24] being most commonly used for the assessment of help-/hopelessness ($n = 11$, 73.33%), the *Demoralization Scale* (DS) [54] for demoralization ($n = 9$, 81.81%) and the *General Self-Efficacy Scale* (GSE) [55] for self-efficacy ($n = 5$, 62.5%).

3.3 | Risk of Bias Rating

Overall, most studies were rated as having some concerns with the most common domain being bias due to confounding and measurement of STBs. For detailed risk of bias ratings and its visualization [56] please see the Open Science Framework: https://osf.io/57fb4/?view_only=672581dd58734264af62f41548e18e9e.

3.4 | Review of Literature

The most often studied type of STBs was suicidal ideation ($n = 26$, 72.22%), followed by a desire for hastened death ($n = 9$, 25%), and suicidal behavior ($n = 1$, 2.78%) [57]. Different instruments were employed for every construct but the *Schedule of Attitudes Toward Hastened Death* (SAHD) [58] was most commonly used for the assessment of desire for hastened death ($n = 4$, 44.44%), the *Beck Scale for Suicide Ideation* (BSS) [59] for suicidal ideation ($n = 7$, 26.92%) and the *Suicidal Behaviors*

Questionnaire—Revised (SBQ-R) [60] for suicidal behavior ($n = 1$, 100%).

Overall, two studies did not find a statistically significant association between their operationalization of perceived control and STBs [47, 53]. Other than that, demoralization and help-/hopelessness had positive relations with STBs and self-efficacy had a negative correlation. Regarding constructs that were labelled as control, two studies examined their association with suicidal thoughts [52, 53]. Jung and Yun [53] reported no relevant association (see above), Wilson et al. [52] found a more than sevenfold increase in risk for serious desire for hastened death in individuals with cancer who described a loss of control compared to those who did not, but the large confidence interval also suggested a substantial degree of uncertainty about the size of this effect (OR = 7.12, 95% CI: 3.00–16.87).

3.5 | Meta-Analysis & Subgroup Analysis

The meta-analysis included 25 articles with 6749 participants from five continents. The main pooled effect for the association of perceived control and suicidal thoughts is presented in Figure 2. The summarized correlation coefficient equals a relatively large, positive association ($r = 0.45$, [95% CI = 0.38–0.52], $Q = 346.15$, $p < 0.01$, $I^2 = 91.2\%$), indicating that reports of less perceived control are related to a higher risk of STBs.

As mentioned above, three main conceptualizations of perceived control were found, self-efficacy, hopelessness, and demoralisation. Stratifying the meta-analysis into these three subgroups partially improved heterogeneity in some subgroups. In contrast, a subgroup analysis showed that effect sizes were insignificantly influenced ($Q = 2.62$, $p = 0.23$) by subgrouping studies into self-efficacy, hopelessness and demoralisation. The moderation analyses demonstrated that the reported cancer stage did not have a significant moderation effect on the link between perceived control and suicidal ideation ($Q_M = 2.68$, $p = 0.10$), but significant differences between general (i.e., general self-efficacy) versus more situation-specific measurements ($Q_M = 5.40$, $p = 0.02$) were found. Situation-specific measurements (e.g., demoralization, hopelessness, health self-efficacy) showed significantly higher correlations ($r = 0.49$, [95% CI = 0.42–0.50]) compared to general self-efficacy measurements ($r = 0.28$, [95% CI = 0.10–0.44]). According to sensitivity analysis, no single study was overly influential on the results.

4 | Discussion

This study presents a comprehensive systematic review with meta-analysis examining the relationship between perceived control and STBs among those with cancer. A better understanding of this association contributes to the identification of psychological risk and protective factors for STBs that can be harnessed in interventions.

In general, the findings indicate a scarcity of systematic quantitative, theory-driven investigations of the proposed association. As only one study investigated suicidal *behavior*, the results

TABLE 1 | Studies reporting about the association between perceived control (PC) and suicidal thoughts and behaviors (STBs) meeting inclusion criteria.

Authors, year [Citation nb.]	Country/region	Sample size	Cancer stage	Age [M (SD)]	Women (%)	Studied STBs	Measurement of STBs	Prevalence of STBs	Indicators for PC	Measurement of PC	Overall association (+/0/-)	Included in meta-analysis
Chochinov et al. 1998 [37]	Canada	196	Advanced	71.0 (10.7)	52.55%	Suicidal ideation	SADS	/	Help-/hopelessness	SADS	+	✓
Breitbart et al. 2000 [38]	USA	92	Advanced	65.9 (6)	59.78%	Desire for hastened death	SAHD	17%	Help-/hopelessness	BHS	+	✓
Jones et al. 2003 [39]	Canada	224	All stages	56.0 (15.3)	51%	Desire for hastened death	SAHD	7% mild DHD 2% high DHD	Help-/hopelessness	BHS	+	✓
Jacobsen et al. 2006 [40]	USA	242	Advanced	57.1 (/)	/	Wish to die	YES	/	Demoralization	Composed of MCG, BC, CGA, GSE	+	✓
Rodin et al. 2007 [41]	Canada	326	Advanced	61.8 (10.7)	42.9%	Desire for hastened death	SAHD	53.1 low DHD 8.3% mild DHD 1.5% high DHD	Help-/hopelessness	BHS	+	✓
Rodin et al. 2009 [42]	Canada	406	Advanced	61.49 (11.02)	42.4%	Desire for hastened death	SAHD	/	Help-/hopelessness	BHS	+	
Madeira et al. 2011 [43]	Portugal	130	All stages	/	73.1%	Suicidal ideation	BSSI	10%	Help-/hopelessness	BHS	+	
Shim and Hahm 2011 [44]	Korea	131	All stages	52.5 (12.1)	39.7%	Desire for hastened death	SAHD	13.7% mild DHD 1.7% high DHD	Help-/hopelessness	Mini-MAC	+	✓
Lee et al. 2012 [45]	Taiwan	234	All stages	/	64.5%	Suicidal ideation	DS-MV	/	Help-/hopelessness	BHS	+	✓
Spencer et al. 2012 [65]	USA	700	Advanced	59.1 (13.1)	48.6%	Suicidal thoughts	YES	8.9%	Self-efficacy	GSE	—	✓
Costantini et al. 2014 [66]	Italy	136	All stages	50.95 (12.4)	83.1%	Suicidal ideation	BSI	18%	Help-/hopelessness	Mini-MAC	+	✓

(Continues)

TABLE 1 | (Continued)

Authors, year [Citation nb.]	Country/region	Sample size	Cancer stage	Age [M (SD)]	Women (%)	Studied STBs	Measurement of STBs	Prevalence of STBs	Indicators for PC	Measurement of PC	Overall association (+/0/-)	Included in meta-analysis
Fang et al. 2014 [67]	Taiwan	200	Advanced	/	52.5%	Suicidal ideation	BSSI	29.5%	Demoralization	DS	+	
Trevino et al. 2014 [68]	USA	603	Advanced	59.44 (13.24)	51.2%	Suicidal ideation	YES	26.2%	Self-efficacy	GSE	—	⊙
Wilson et al. 2014 [52]	Canada	377	Advanced	67.2 (12.9)	55.2%	Desire for death	SISC	30.5% mild DHD 12.2% high DHD	Loss of control	SISC	+	
Eskelinen et al. 2015 [48]	Finland	34	All stages	51.6 (—)	100%	Suicidal thoughts	MADRS	/	Help-/hopelessness	MADRS	+	⊙
Diaz-Frutos et al. 2016 [69]	Spain	224	All stages	61.7 (12.9)	56.9%	Suicidal ideation	BSSI	24.24%	Help-/hopelessness	BHS	+	
Moreno-Montoya, Palacios-Espinosa and Gracia-Ruiz, 2017 [70]	Columbia	132	All stages	/	/	Suicidal ideation	BSSI	21%	Help-/hopelessness	BHS	+	⊙
Ozdemiroglu et al. 2017 [71]	Turkey	117	All stages	56.99 (12.53)	48.7%	Suicidal ideation	BSSI	/	Help-/hopelessness	BHS	+	
Vehling et al. 2017 [72]	Germany	430	All stages	56.7 (11.6)	50.5%	Suicidal ideation	CIDI-O	9.3%	Demoralization	DS	+	
Zhang et al. 2017 [51]	China	51	All stages	54.85 (11.40)	15.4%	Suicidal ideation	BSSI	18.40%	Help-/hopelessness	BHS	+	⊙
Ko et al. 2018 [73]	Taiwan	113	All stages	66.7 (4.8)	59.3%	Suicidal ideation	BSSI	23.9%	Demoralization	DS	+	⊙
Monforte-Royo et al. 2018 [74]	Spain	193	Advanced	62.6 (9.9)	41.5%	Wish to hasten death	AFIDD	23.8%	Self-efficacy	GSE	—	⊙
Nanni et al. 2018 [63]	Portugal	195	All stages	53.55 (10.51)	77.9%	Suicidal ideation	PHQ-9	8.2%	Demoralization	DS	+	
Kelliher-Rabon et al. 2019 [57]	USA	235	All stages	61.28 (27.63)	64.3%	Suicidal behavior	SBQ-R	/	Help-/hopelessness	BHS	+	⊙
Xu et al. 2019 [75]	China	303	/	/	47.5%	Suicidal ideation	PHQ-9	14.5%	Demoralization	DS	+	

(Continues)

TABLE 1 | (Continued)

Authors, year [Citation nb.]	Country/region	Sample size	Cancer stage	Age [M (SD)]	Women (%)	Studied STBs	Measurement of STBs	Prevalence of STBs	Indicators for PC	Measurement of PC	Overall association (+/0/-)	Included in meta-analysis
Crespo et al. 2020 [76]	Spain	153	Advanced	63.5 (9.3–9.8)	43.14%	Desire for death	DDRS	33.33%	Self-efficacy	GSE	—	✓
Liu et al. 2020 [16]	China	244	All stages	/	52.9%	Suicidal ideation	SIOSS	/	Demoralization	DS	+	✓
Xu et al. 2020 [77]	China	544	All stages	59.9 (11.6)	51.8%	Suicidal ideation	YES	26.3%	Self-efficacy	SUPPH	+	✓
Abd-Elrhman et al. 2022 [46]	Egypt	305	All stages	42.73 (9.88)	100%	Suicidal ideation	SPS	/	Self-efficacy	SMSES-BC	—	✓
Chang et al. 2022 [47]	Taiwan	121	All stages	50.84 (8.59)	100%	Suicide ideation/risk	Suicide risk by DS-MV & PHQ-9	1.65%	Demoralization	DS	0	✓
Chang et al. 2022 [49]	Taiwan	155	All stages	52.9 (9.7)	5.2%	Suicidal ideation	DS-MV	11.61%	Demoralization	DS	+	✓
Jung and Yun 2022 [53]	Korea	612	All stages	55.72 (/)	58.5%	Suicidal ideation	BDI	8.1%	Control over life	MCG	0	✓
Lai et al. 2022 [78]	China	588	All stages	57	40.5%	Suicidal ideation	SIOSS	24.7%	Demoralization	DS	+	✓
Liu et al. 2023 [50]	China	200	All stages	43.1 (10.1)	100%	Suicidal ideation	SIOSS	/	Self-efficacy	GSE	—	✓
Luo et al. 2022 [79]	China	560	All stages	/	39.64%	Suicidal ideation	SIOSS	25.98%	Demoralization	DS	+	✓
Yang et al. 2022 [80]	China	358	All stages	55.2 (3.8)	52.51%	Suicidal ideation	BSSI	/	Self-efficacy	CBI	—	✓

Abbreviations: —, negative correlation; +, positive correlation; 0, no significant correlation; AFIDD, Assessment of the Frequency and Intensity of the Desire to Die; BC, Brief COPE; BHS, Beck Hopelessness Scale; BSI, Brief Symptom Inventory; BSSI, Beck Scale for Suicide Ideation; CBI, Cancer Behavior Inventory; CGA, Complicated Grief Assessment; CIDI-O, Composite International Diagnostic Interview—Oncology; DDRS, Desire for Death Rating Scale; DHD, Desire for hastened death; DS, Demoralization scale; GSE, General Self-Efficacy Scale; M, mean; MADRS, Montgomery-Asberg depression rating scale; MCG, McGill Quality of Life Questionnaire; Mini-MAC, MINI-Mental Adjustment to Cancer Scale; Nb., number; PHQ-9, Patient Health Questionnaire-9; SADS, Schedule for Affective Disorders and Schizophrenia; SAHD, Schedule of Attitudes Toward Hastened Death; SBQ-R, Suicidal Behaviors Questionnaire—Revised; SD, standard deviation; SIOSS, Self-rating idea of suicide scale; SISC, Structured Interview of Symptoms and Concerns; SMSES-BC, Symptom-Management Self-Efficacy Scale—Breast Cancer; SPS, Suicide Probability Scale; SUPPH, Strategies Used by People to Promote Health; YES, Yale Evaluation of Suicidality.

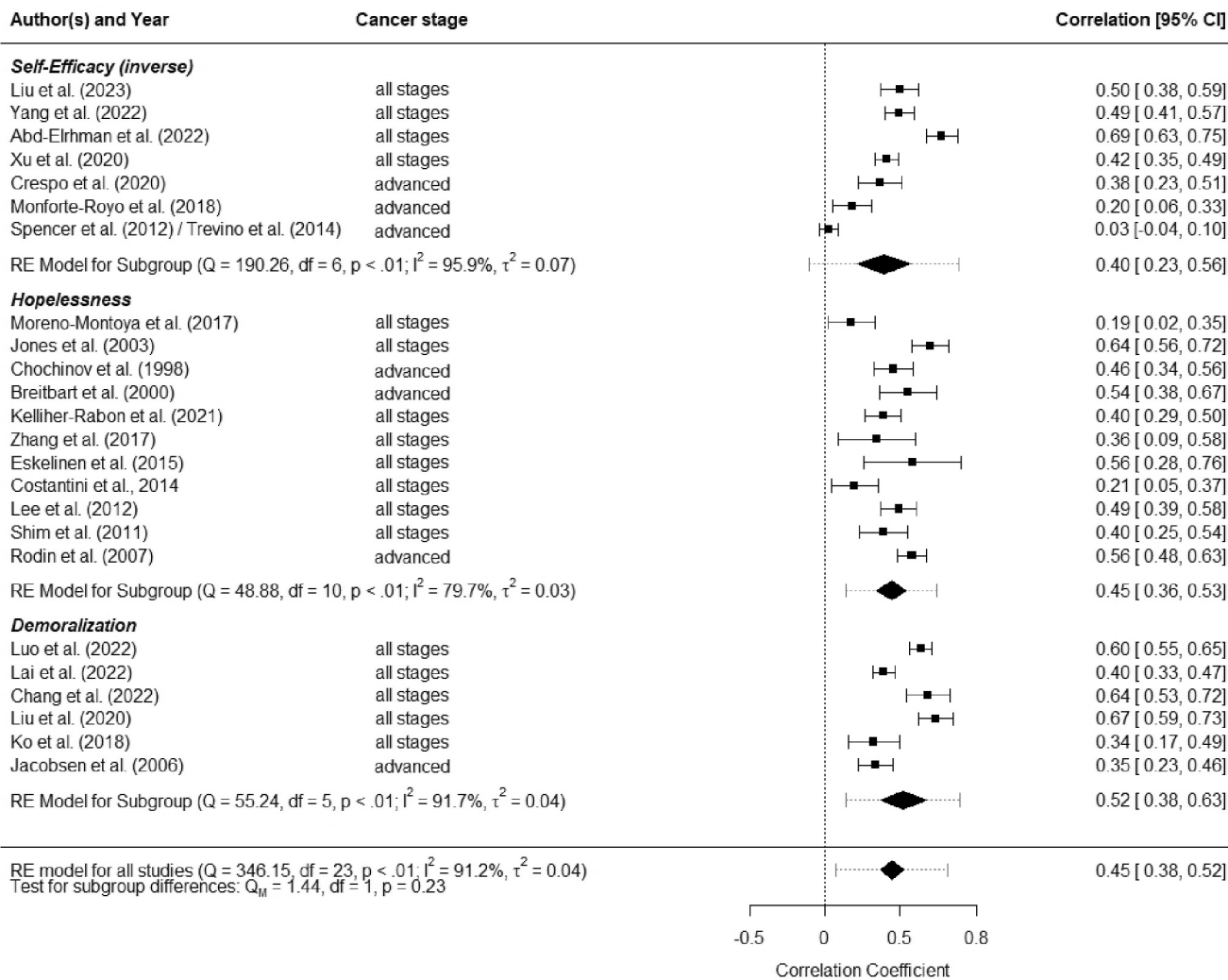


FIGURE 2 | Forest Plot of the exploratory meta-analysis and subgroup analyses (stratified by different conceptualizations of the perceived control construct). The plot depicts the overall and stratified model fit and pooled effect sizes estimates (correlation coefficient and corresponding 95% confidence intervals). As Spencer et al. [41] and Trevino et al. [44] contained dependent data, it was aggregated within the meta-analysis. CI, confidence interval; RE model, random-effects model.

mainly give insight into the relevance of the constructs of interest for suicidal thoughts. However, this is also the main purview of the present investigation as perceived control plays a particular role in the emergence of suicidal thoughts according to contemporary suicide theories (e.g. 3ST, IPT, IMV model) [11, 12, 17]. The summary of the included studies shows that it is meaningful to address suicidal ideation and associated factors in all stages of the disease (not just in terminal illness/palliative care). Furthermore, given the last decades' advances in the diagnosis and treatment of cancer, it increasingly becomes a chronic illness after or with which, respectively, people still live years or decades. As such, suicide prevention in this vulnerable group is an ongoing effort, and the earlier in the progress from thoughts to behaviors vulnerable individuals receive help, the more beneficial it will be [61].

The identified original studies focused on various conceptualizations of perceived control, which were more or less related to perceived control as defined by Rothbaum, Weisz, and Snyder [20]. We chose this definition as one of this study's starting points because of its theoretical fit and ample evidence from

related fields, in particular psychology, stress and emotion research [20, 29]. Still, as we identified no single empirical study that examined the link between perceived control in its most narrow, theoretically-based conception in relation to STBs in those with cancer, it seems insufficiently implemented in psycho-oncological research, at least with regard to current work targeting suicidality and suicide prevention [62].

Besides the two studies testing constructs explicitly labeled as control (i.e., loss of control [52]; control over life [53]), self-efficacy, which was investigated by eight studies, was the construct most closely related to perceived control. Negative associations between the respective construct of interest and suicidal thoughts were found in every single study and confirmed in the pooled correlation of our (subgroup) meta-analysis. In fact, the pooled correlation indicated a relatively large effect [35], indicating that the more self-efficacious a person with cancer feels, the lower their risk of reporting suicidal thoughts. Lastly, most studies focused on help-/hopelessness and demoralization as potential risk factors for STBs. Both of these constructs are well-established in the oncological context and have shown relevant

associations with STBs in past research [26] and the present synthesis. While help-/hopelessness was mentioned in Skinner's [24] list of control terms, measures of demoralization partially contain control as a subscale (depending on the instrument), but mostly rather relate to disheartenment and loss of purpose [40, 63]. Notably, hopelessness is also a crucial element of several influential conceptualizations of suicide risk: The Three-Step Theory by Klonsky and May [11] and Joiner's Interpersonal Theory of Suicide [12]. Lastly, and more generally, hopelessness plays a crucial role in Beck's cognitive theory of depression. It is closely related to the negative cognitive triad (in particular, its "negative future" component) and as such contributes to the development and maintenance of depressive symptoms [64]. Further, while both hopelessness and demoralization overlap with or include aspects of perceived control, they also capture the individual's emotional subjective experience. For instance, definitions of demoralization comprise the notion of existential distress [25]. As such, it is not surprising that these constructs showed particularly sizeable correlations with STBs and, by comparison, the largest pooled effect size of all subgroup analyses in the present study.

The overall pooled effect size was substantial and in the hypothesized direction, that is, individuals with cancer who expressed a lack of perceived control were at higher risk of reporting suicidal thoughts. Considering this observation, it is not surprising that distinguishing the different types of constructs had no significant impact on the targeted correlation (i.e., perceived control and STBs) as they shared conceptual similarities. However, the moderation analysis showed that specific constructs/measurements (i.e., hopelessness, demoralization, health self-efficacy) had a significantly greater association with suicidal ideation compared to more general measurements (i.e., general self-efficacy). Cancer stage did not moderate the link between perceived control and suicidal ideation in the current meta-analysis. As only few studies explicitly focused on advanced cancer stages ($n = 7$), and the studies investigating samples with all stages included advanced cancer stages as well the true effect of this variable might have been concealed.

The meta-analysis indicated a large heterogeneity of the presented data. This shows that there are substantial differences across studies which could potentially influence the strength and direction of the association between perceived control and STBs. Although subgroup analyses were conducted, the high heterogeneity partly persisted in these findings as well and the number of available effect sizes was too small to conduct further sensitivity analyses or subgroup analyses ascertaining which aspects of the original studies drove the observed heterogeneity (e.g., sociodemographic or cancer-specific characteristics). However, it supports the notion of this research field being affected by jingle-jangle fallacies. As such, the high heterogeneity is not just due to illness-related aspects (e.g., with a poor prognosis having a potential bearing on hopelessness), psychosocial variables or study settings, but also affected by the varying understanding and use of the same term.

Thus, while the main results of the systematic review and meta-analysis support the conceptualization of perceived control

within the psychological process ultimately shaping suicide risk, it also revealed gaps in the literature that need to be addressed by future research. As no study has examined the link between perceived control in relation to STBs in individuals with cancer, assumptions about the results' fit with the proposed theoretical framework can only be made in more general terms. Still, the substantial effect sizes underline the usefulness of the theory-driven investigation of psychological factors that capture the extent of perceived control as a patient-reported outcome in the context of suicide prevention in cancer. Future research could orient this even more stringently along the concepts presented and extend it to cancer survivors (instead of only acutely ill persons) and suicidal behaviors as well as thoughts.

4.1 | Study Limitations

Given the scarcity of original research with more narrow conceptualizations of perceived control, the present study employed a rather broad approach to investigate its link with STBs in individuals with cancer and cancer survivors. Even though we quantified the jingle-jangle fallacies in this context, the scarcity of available studies and thus available effect sizes limited subsequent data analysis (e.g., moderation analyses) ascertaining which aspects of the original studies drove the observed heterogeneity. Future studies should therefore carefully consider the operationalisation of their (control-) constructs to help reduce the jingle-jangle fallacies in this research field in the long run and thus achieve clearer conclusions. Despite the significant results of the moderation analysis focusing on the effect of specific versus broad measurements, the group of more general measurements of perceived control (i.e., general self-efficacy) only consisted of 5 studies. Future studies need to explore potential differences in different control constructs. The distinction according to Rothbaum, Weisz, and Snyder [20] could be an interesting way to further understand the role of perceived control in coping with cancer. It would also be advisable to conduct further moderation analyses to ascertain the validity and robustness of the present findings, including across different sociodemographic groups (e.g., cultural differences). Future syntheses should thus replicate the present work, ideally using approaches that are not affected by the difficulties associated with summary data (e.g., of sex/gender and age distributions) such as individual-participant meta-analyses.

Along these lines, there are factors underlying the variation in STBs in cancer populations that were not well represented within the original studies. First, there was a lack of studies investigating suicide deaths and attempts. Therefore, the present work does only allow for cautious conclusions about the extent to which perceived control is related to suicidal *behavior* but rather *suicidal thoughts*. In general, more investigations concentrating on the effects of perceived control on STBs in those with cancer are needed. Ideally, they would employ standardized measures and consistent methodologies (as measurement and confounding were the most prominent domains of risk of bias identified), especially within this research field affected by jingle-jangle-fallacies.

4.2 | Clinical Implications

The findings have important clinical implications for screening and treating individuals with and after cancer as they highlight perceived control as a potential therapeutic target in prevention and intervention efforts. There are different avenues to fostering perceived control through psychosocial interventions (e.g., psychoeducation, enhancing coping skills, cognitive restructuring, aligning life with the disease to one's values) and medical pathways (e.g., informed consent, shared decision-making) which may ultimately reduce suicide risk. Secondary control strategies such as aligning life with one's individual values, especially if important aspects of life "before" had to be given up, might be of particular importance in those affected by loss of control. Consistent with prevalence rates [3–7], modern suicide theories (e.g., 3ST, ITP, IMV) [11, 12, 17] build a stable ground for understanding the impact of the perceived loss of control due to a cancer diagnosis. To strengthen suicide prevention in cancer treatment and survivorship, efforts should be made to reduce all circumstances giving rise to such feelings, one of them being the subjective loss of control. Given the complex interplay of factors influencing perceived control, a multidisciplinary approach involving psychiatrists, oncologists, nurses, psychologists/psychotherapists, social workers and other healthcare professionals seems essential.

4.3 | Conclusion

This work is the first comprehensive, systematic synthesis of original research on the association of perceived control and STBs in individuals with cancer and cancer survivors. Based on the pooling of 25 effect sizes, we found that demoralization, help-/hopelessness, and self-efficacy were the most commonly studied control dimensions. Their high relevance for suicide prevention in the context of cancer is indicated by the relatively large, pooled correlation with suicidal ideation overall ($r = 0.45$) and also for each operationalisation in their own right. Thus, the results underscore the importance of perceived control in shaping severe psychological distress in a vulnerable group. At the same time, the present study shows that more original investigations are needed examining perceived control in the more narrow sense of its original definitions (incl. its subscales of primary and secondary control). Despite the limitations, the results expand previous knowledge and highlight an under-researched protective factor that could inform prevention by sensitive screening and effective intervention tailored to patients' needs, both in suicidal crises and beyond.

Author Contribution

As the first author *Judith Hirschmiller* originally conceptualized and design the theoretical framework and the research design. She conducted the systematic search, in- and exclusion and systematically reviewed the literature. She contributed to the statistical analysis and interpretation, designed figures and tables and was mainly responsible for writing the manuscript. *Jim Schmeckenbecher* contributed to the statistical analysis and modeling of the meta-analysis, he designed the forest plot and contributed to the data interpretation. He contributed to the manuscript

creation. *Tamara Schwinn* contributed to the conceptualization and design of the presented work, she further contributed to the data collection and critically reviewed the manuscript. *Jörg Wiliink, Elmar Brähler, Nestor Kapusta, Rüdiger Zwerenz* and *Manfred Beutel* contributed by critically reviewing the manuscript. *Mareike Ernst* supervised the overall project. Besides her contribution to the conceptualization of the study as well as the data collection, she critically reviewed and contributed to the manuscript, edited and proofread it.

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Ethics Statement

The authors have nothing to report.

Conflicts of Interest

The authors have no conflicts of interest to declare. The work is part of the first author's dissertation.

Data Availability Statement

Extensive supplemental material, including all underlying data, is provided via Open Science Framework: https://osf.io/57fb4/?view_only=672581dd58734264af62f41548e18e9e.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.