

Review Article

Assessing the Will to Live: A Scoping Review

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Abstract

Context. The will to live (WTL) is an important factor to consider in the context of providing resource-oriented palliative care. Until now, there has been no major review of the existing research on this subject.

Objectives. The primary objective of this study is to summarize the state of research concerning instruments that assess the WTL. The secondary objective is to explore the theoretical models and psychometric properties of these instruments, in studies where these instruments were initially presented. The tertiary objective is to identify, among all studies where these instruments have been used, the intensity of the WTL, and factors associated with it.

Methods. We conducted a scoping review, including studies that were designed to assess the WTL among participants in all settings. Records were systematically searched from seven bibliographic databases with no date limitations up to August 2020.

Results. Of the 3078 records screened, 281 were examined in detail and 111 were included in the synthesis. A total of 25 different instruments quantitatively assessing the WTL are presented. Most are single-question tools and rate intensity. The underlying concepts and psychometric properties are incompletely explained. Lack of crossreferencing is apparent. The intensity of the WTL is high, even among people with significant health impairment, and is frequently associated with different factors, such as resilience and quality of life.

Conclusion. A considerable yet unconnected body of studies assesses the WTL. Its assessment in clinical routine could promote resource-oriented and patient-centered care. *J Pain Symptom Manage* 2020;■:■–■. © 2020 The Authors. Published by Elsevier Inc. on behalf of American Academy of Hospice and Palliative Medicine. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Key Words

Will to live, wish to live, positive psychology, scoping review, geriatrics, palliative care

Key Message

More than 100 studies used 25 different instruments to assess the will to live. The diversity of assessment tools highlights a lack of conceptual coherence and open questions. The intensity of assessed will to live is high, even in severely ill patients.

Introduction

In clinical practice and research in palliative care, an increasing focus is placed on the identification

and activation of psychosocial resources with a potential to improve the patients' and families' quality of life.^{1,2} The will to live (WTL) is an important indicator of the subjective well-being of older patients.³ WTL has been defined as "the psychological expression of one's commitment to life and the desire to continue living, encompassing both instinctual and cognitive components."⁴ Self-awareness of one's WTL arises when people realize that they are approaching the end of their life.³

WTL is a concept different from personal longevity motivation, which assesses preferred life expectancy

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and explores how people project themselves into the future.⁵ Although we can imagine associations between these two concepts, WTL is distinct in its focus on the present: does the person, at the present moment, have an existential motivation to live? Moreover, WTL is not simply the opposite of the wish to die, a much-studied concept to date.^{6,7} The wish to die and WTL can coexist in the same person. Assessing how strong WTL is may imply simultaneous or prior consideration of not wanting to keep on living. Sometimes, expressing a wish to die can even be a manifestation of WTL, a cry for help from those who want to continue living, but not in this way.⁸ Finally, WTL is also different from the concept of zest for life, which focuses not just on living but on living well.⁹

Until now, it has remained unclear precisely how WTL can be accurately assessed. Mostly, numerical rating scales have been used to assess WTL in terms of intensity.^{3,10} However, there is neither consensus on how to define or measure the intensity of WTL nor has it been the subject of an extensive review so far.

Therefore, the primary aim of this scoping review is to summarize the state of the art of instruments assessing WTL. Secondary aims are to explore the theoretical model behind these assessment tools, as well as their psychometric properties, in studies where these instruments are initially presented. An additional aim is to identify, across all studies where these instruments have been used, the intensity of WTL, and associating factors contributing to it.

Methods

This review was conducted following guidance for scoping reviews from the JBI Manual for Evidence Synthesis.¹¹ A scoping review aims to identify, in a given field, available evidence, ways of conducting research, and knowledge gaps.¹² Reporting follows the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews guidelines.¹³ A review protocol has been established at the outset of the study and is available on request.

Inclusion Criteria

Studies were included if they were designed to quantitatively assess WTL among participants in all settings with no date restrictions. We excluded articles without primary data, studies assessing preferred life expectancy (longevity), and texts not written in English, French, German, or Italian.

Search Strategy

A comprehensive search was conducted, supported by a specialized librarian, on August 13, 2020 in the following seven bibliographic databases: PubMed,

Embase.com, Cochrane Library Wiley, Web of Science Core Collection, APA PsycInfo Ovid, CINAHL with Full Text EBSCO, and ProQuest Dissertations & Theses A&I. Full search strategies are provided in Appendix I. An additional search was conducted in Google Scholar among the first 200 results. Records were exported into EndNote X9 (Clarivate Analytics, Philadelphia, PA), and duplicates were removed.

Additional records were identified through backward and forward citation searching, among studies where WTL assessment instruments were initially presented. A search was also conducted on whether the main authors used the instruments they had developed in other studies. Lead authors were contacted for more information in the case of abstracts or conference proceedings without subsequent full articles and articles with important information missing.

Study Selection

Among identified records, titles and abstracts were reviewed by the first author using the Rayyan tool.¹⁴ After exclusion of clearly irrelevant records, potentially relevant articles were retrieved as full text and assessed. Difficulties concerning inclusion were resolved in consultation with coauthors.

Data Extraction

Information about the studies' settings (e.g., country of origin), the instruments used to assess WTL, the underlying theoretical models (i.e., the definition of WTL on which the instrument was built), psychometric properties, the intensity of WTL, and associated factors (e.g., quality of life) were collected from the original publications by the first author. Psychometric properties were explored by reviewing the availability of information about internal consistency, reliability (also known as test-retest reliability), content validity, construct validity (structural validity and hypotheses testing), and criterion validity according to the CONsensus-based Standards for the selection of health Measurement INSTRUMENTS taxonomy.¹⁵ If enough information was available about intensity, average scores were converted to a weighted score ranging from 0 to 10, with higher scores indicating higher WTL.

Results

Instruments Assessing WTL

Search Results. The search strategy initially yielded 4355 records, and 215 records were identified from an additional search (Fig. 1). After exclusion of duplicates, 3078 records remained: 2797 were clearly irrelevant, and 170 were excluded after full-text assessment,

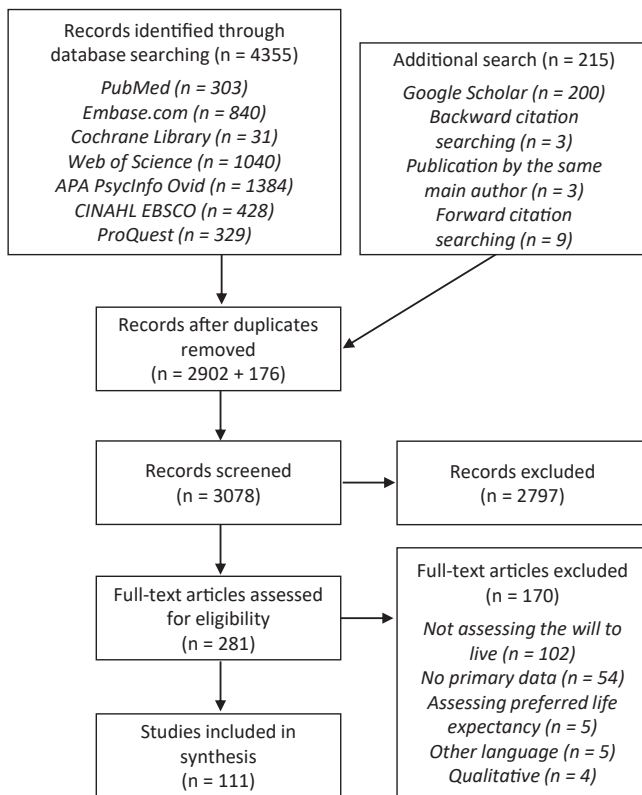


Fig. 1. Inclusion flow diagram.

leaving a final sample of 111 records. Among them, 25 quantitative assessment instruments were presented, and their further uses were described in 86 other articles.

Settings. Instruments were mainly developed among palliative care patients ($n = 10$), older people ($n = 8$), or psychiatric patients ($n = 3$). Development studies were conducted in high-income countries, such as the U.S. ($n = 11$), Australia ($n = 3$), and Israel ($n = 2$), across the last six decades. After development, the instruments were applied in similar or nearby settings (see [Table 1](#) for details).

Characteristics of Instruments. The assessment tools were primarily self-administered instruments composed of questions to measure intensity of WTL ([Table 1](#)). Most instruments explicitly used the term *will to live*, but only three explicitly presented a theoretical model to the respondents before asking them questions. Fifteen instruments consisted of a single question, eight comprised two to seven items, and two had more than 10 items. A comprehensive presentation of these instruments is available in [Appendix Table 1](#).

Several similarities can be observed in different instruments. The most frequent element is the evaluation of WTL on an intensity scale, ranging from not

willing to live at all to strong WTL. Questions are posed without mentioning a specific time interval, suggesting that they refer to the current state of life. Seventeen instruments are standardized general assessments, intended for every kind of person or patient. Only eight instruments, with many items, are designed for patients with a specific health status (cancer and suicidal intent) or for specific populations (retired persons and victims of violent conflicts).

Theoretical Models and Psychometric Properties

Theoretical Models. The theoretical models underlying WTL are presented as short texts and are poorly documented ([Table 2](#)). For five of the relevant instruments, no information at all is given on the underlying theoretical model (for details, see [Appendix Table 1](#)).

Several articles relate WTL to survival and wish to continue living, an instinct partly influenced by a global state of well-being.^{3,16–20} Other articles mention the internal struggle between life and death, addressing suicide.^{21–26} Finally, several authors explicitly claim to present an unstudied topic.^{10,16,23} In this regard, we identified that the different studies were not crossreferenced with one another. Among the 25 articles presenting the development of an instrument, backward citation searching found that, on average, each article cited 0.52 (SD 1.23; median 0.00) articles among the 24 others. Eighty percent did not cite previous instruments.

The oldest reference cited in these articles is a best-seller entitled *The Will to Live* written in 1951 by Hutschnecker, who was later a physician to President Nixon. Hutschnecker emphasizes that illness is not only physical and that it reflects an underlying struggle between destructive and creative forces. WTL is described as the drive of this powerful tendency to stay alive and achieve a goal: Hutschnecker encourages everyone to take time to cultivate their WTL to actively support their own health and well-being.²⁷

Psychometric Properties. Information about psychometric properties available in the articles is described in [Table 2](#). Notably, none of the instruments provides full psychometric information. In particular, all the instruments lack information about criterion validity, and information about content validity and reliability is most often unavailable. For the multi-item tools, data on internal consistency and structural validity are generally present. For hypothesis testing, most of the articles present associations between WTL and other variables. However, in most of these articles, several key points needed to complete a high-quality assessment—according to the criteria of COnsensus-based Standards for the selection of health Measurement INstruments—are missing.

Table 1
Development and Setting of Instruments to Assess the WTL

Instrument, First Author, and Year	Development Sample	Instrument Structure	Further Use
WTL scale, Ellison 1969 ²¹	U.S., 108 retired steelworkers Mean age 69.3 yrs (SD 5.3)	Seven items (four-point Likert scale) Score: 28–0 (20–28, low; 10–19, medium; 0–9, high)	43–48
Wish to Live Sliding Scale, Kovacs 1975 ²²	U.S., 87 patients hospitalized after suicide attempts Mean age 30.6 yrs	One item (nine-point Likert scale) Score: 0–8 (0, not at all; 8, very much)	49–51
Self-rating WTL scale, Varna Garis 1977 ²³	U.S., 63 senior citizens Age 60–95 yrs	One item (101-point Likert scale) Score: 0–100 (0, the least anyone could have; 100, the most)	52
WTL, Weiher 1989 ⁵³	U.S., 51 patients with melanoma Mean age 47.5 yrs (22–76)	Heteroevaluation One item (seven-point Likert scale) Score: 1–7 (1, little or no WTL; 7, strong WTL)	—
WTL, Katz 1989 ⁵⁴	U.S., 221 health professionals Mean age not specified	Heteroevaluation of case scenario 25 items (Semantic Differential Scale) Score not specified	—
WTL scale, Yates 1993 ⁵⁵	Australia, 152 patients with cancer using or not alternative therapies 77% aged 41–60 yrs	13 items (five-point Likert scale) Score: very strong/strong, extremely strong	56,57
WTL, Fox 1994 ⁵⁸	U.K., 142 patients with proximal femoral fractures Mean age not specified	Heteroevaluation One item (two-point Likert scale) Score: no, yes	—
WTL, Carmel 1997 ¹⁶	Israel, 1138 older people Hebrew or Russian language Mean age 77.5 yrs (SD 5.4)	One item (six-point Likert scale) Score: 0–5 (0, no WTL; 5, very strong)	59–68
Wish to live, McMillan 1997 ⁶⁹	U.K., one extremely severe head injury patient Age 25 yrs	Three items (two-point Likert scale) Score: no, yes, inconsistent	70–72
WTL Visual Analogue Scale, Chochinov 1999 ¹⁰	Canada, 168 terminally ill patients hospitalized in a palliative care unit Median age 73 yrs (65–81)	Added to the Edmonton Symptom Assessment System One item (11-point Likert scale) Score: 10–0 (10, no WTL; 0, complete WTL)	73–87
WTL—attachment to life, Albert 1999 ¹⁷	U.S., 121 ALS patients Mean age 59.7 yrs (SD 12.7)	Six items (five-point Likert scale) Score not specified	88
WTL measure, Levy 2002 ⁸⁹	U.S., 660 retired citizens Mean age 63.0 yrs (SD 9.2)	Three items (seven-point Likert scale) Score not specified	—
Willingness to live, Czapiński 2004 ¹⁸	Poland, 4077 households and 9845 household members Polish language Longitudinal study; conducted from 1991 to 2015 Age 16 yrs and older	One item (10-point Likert scale) Score: 1–10 (1, I do not want to live at all; 10, I want to live very strong)	90–100
WTL Visual Analogue Scale, Adelman 2004 ¹⁰¹	U.S., 138 ALS patients and family caregivers Patients' mean age 58.1 yrs (SD 14.3) Caregivers' mean age 61.9 yrs (SD 14.9)	One item (10-point Likert scale) Score: 1–10 (1, not at all; 10, very much)	102–105
WTL scale, Beadle 2004 ¹⁹	Australia, 149 ambulant patients with advanced cancer Median age 57 yrs	Five items (five-point Likert scale) Score: 25–5 (25, weak; 5, strong)	106
Wish to live—first item from the Scale for Suicide Ideation, Brown 2005 ²⁴	U.S., 5814 patients from a psychiatry outpatient clinic Mean age 36 yrs (SD 12)	One item (three-point Likert scale) Score: 2–0 (2, none; 1, weak; 0, moderate to strong)	107–117
WTL numerical analogue format, Crawford 2008 ¹¹⁸	Australia, 84 palliative outpatients Age older than 18 yrs	One item (11-point Likert scale) Score: 0–10	119
Wish to live—first item from the Yale Evaluation of Suicidality Scale, Lichtenthal 2009 ²⁵	U.S., 289 patients with advanced cancer Mean age 58.7 yrs (SD 12.0)	One item (four-point Likert scale) Score: absent, present	120–122
WTL, Brocks 2011 ¹²³	Germany, 28 patients consenting to transcatheter aortic valve implantation; German language Median age 82.5 yrs	One item (four-point Likert scale) Score: 1–4	—
Wish to live—one item from the suicide status form, O'Connor 2012 ²⁶	U.S., 105 inpatients with suicidal ideations Mean age 36 yrs	One item (seven-point Likert scale) Score: 1–7 (1, not at all; 7, very much)	122,124–127
Attitude changes—increased motivation to live, Seike 2014 ¹²⁸	Japan, 51 dementia patients and 119 family members Japanese language Mean age 78.8 yrs (SD 6.6)	One item (five-point Likert scale) Score: disagree, agree	—

(Continued)

Table 1
Continued

Instrument, First Author, and Year	Development Sample	Instrument Structure	Further Use
WTL, Mello 2016 ¹²⁹	Brazil, 13 patients with cancer in a palliative care unit Portuguese language Mean age 56.0 yrs (SD 18.2)	Heteroevaluation Two items (five-point Likert scale) Score: 1–5 (1, severely compromised; 5, not compromised)	—
WTL scale, Carmel 2017 ⁸	Israel, 868 older people Hebrew or Russian language Mean age 83.9 yrs (SD 3.9)	Five items (six-point Likert scale) Score: 0–5	4,130–132
WTL, Gonzalez 2017 ¹³³	Spain, 832 citizens older than 50 yrs Spanish language Mean age 64.7 yrs (SD 10.2)	One item (five-point Likert scale) Score: 1–5 (1, hardly ever; 5, almost always)	134
WTELS scale, Kira 2020 ²⁰	Egypt, 490 citizens exposed to Arab Spring events Arabic language Mean age 26.0 yrs (SD 10.9)	Six items (six-point Likert scale) Score: 0–5	135–139

WTL = will to live; ALS = amyotrophic lateral sclerosis; WTELS = will to exist, live, and survive. Instruments are in the English language unless otherwise indicated.

Intensity of WTL and Associated Factors

Intensity. Those studies that addressed the intensity of WTL in various settings were further analyzed: scores were weighted on a numerical rating scale from 0 to 10 (Fig. 2). Overall, the mean WTL was 7.6 (SD 1.5; median 8.0). In psychiatric settings, the mean was 6.8 (SD 2.1; median 7.4); in geriatric patients, 7.5 (SD 1.1; median 7.8); in palliative care and oncology, 7.9 (SD 1.2; median 8.2); and in other settings, 8.4 (SD 0.8; median 8.1).

Factors Associated With WTL. Across the identified studies, a large and varied number of biopsychosociospiritual descriptors have been studied as potential correlates of WTL (Appendix Table 2). The strongest links are found for psychological variables: there is a positive correlation with resilience ($r = 0.63$; numbers presented in this section are a selection of the most significant examples), life satisfaction ($r = 0.55$), happiness ($r = 0.48$), and purpose in life ($r = 0.42$). Correspondingly, there is an inverse correlation with wish to die ($r = -0.81$), suicidal intent ($r = -0.76$), and depressive symptoms ($r = -0.63$). For general variables, there is a strong positive correlation with quality of life ($r = 0.51$) and self-rated health ($r = 0.45$). In social descriptors, there is a positive correlation with the presence of social contacts ($r = 0.47$) and an inverse association with the feeling of being a burden to others ($r = -0.61$). Small associations with age ($r = -0.25$) and functional status ($r = 0.36$) were found. The weakest associations are with educational ($r = 0.21$) and economic status ($r = 0.20$).

Discussion

Our findings show that many authors have developed or used instruments assessing WTL. To the

best of our knowledge, this is the first attempt to synthesize the literature on this topic.

Instruments Assessing WTL

Most of the identified instruments were single-item tools assessing the intensity of WTL. These kinds of single-item assessments are comparable to those used for studies into, for example, quality of life or pain, which have been shown reliable in comparison with complex questionnaires and offer significant advantages in terms of reduced burdens of answering.^{28–30} Of course, the concept must be easy to understand and coherent for assessment with a single-item instrument. Our results show a consensus that WTL is both a self-explanatory and well-understood concept.

Most studies were carried out with patients or older people. This focus is no coincidence; disease and aging threaten life, and patients or older people need the positive energy of WTL to cope with these situations. The desire to sustain and improve a patient's or loved one's life, despite difficult contexts marked by suffering and death, is a common motivation for caregivers. An extract from the definition of palliative care by World Health Organization illustrates this: "Palliative care ... affirms life and ... offers a support system to help patients live as actively as possible until death."³¹ Even when an instrument for assessing WTL has been developed in such specific settings, it might apply to a range of other contexts as well.

Theoretical Models and Psychometric Properties

The lack of crossreferencing between studies that present new instruments for assessing WTL is striking. This gap may be explained by the fact that many of these studies were published several years ago, and their authors did not have access to the efficient bibliographic tools available today. It might also be

Table 2
Availability of Information About the Underlying Theoretical Model and About Psychometric Properties

Instrument, First Author, and Year	Theoretical Model	Internal Consistency	Reliability	Content Validity	Construct Validity		Criterion Validity
					Structural Validity	Hypotheses Testing	
WTL scale, Ellison 1969 ²¹	✓		✓				✓
Wish to Live Sliding Scale, Kovacs 1975 ²²	✓	—			—		✓
Self-rating WTL scale, Varna Garis 1977 ²³	✓	—			—		✓
WTL, Weiher 1989 ⁵³	✓	—			—		✓
WTL, Katz 1989 ⁵⁴	✓	—			—		✓
WTL scale, Yates 1993 ⁵⁵	✓	✓ ($\alpha = 0.87$)		✓			✓
WTL, Fox 1994 ⁵⁸	✓	—			—		✓
WTL, Carmel 1997 ¹⁶	✓	—			—		✓
Wish to live, McMillan 1997 ⁶⁹	✓		✓				✓
WTL Visual Analogue Scale, Chochinov 1999 ¹⁰	✓	—	✓		—		✓
WTL—attachment to life, Albert 1999 ¹⁷	✓	✓ ($\alpha = 0.74$)					✓
WTL measure, Levy 2002 ⁸⁹	✓	—			✓ (Unifactorial)		✓
Willingness to live, Czapiński 2004 ¹⁸	✓	—			—		✓
WTL Visual Analogue Scale, Adelman 2004 ¹⁰¹	✓	—			—		✓
WTL scale, Beadle 2004 ¹⁹	✓	✓ ($\alpha = 0.82$)		✓	✓ (Unifactorial)		✓
Wish to live—first item from the Scale for Suicide Ideation, Brown 2005 ²⁴	✓	—			—		✓
WTL numerical analogue format, Crawford 2008 ¹¹⁸	✓	—			—		✓
Wish to live—first item from the Yale Evaluation of Suicidality Scale, Lichenthal 2009 ²⁵	✓	—			—		✓
WTL, Brocks 2011 ¹²³	✓	—			—		✓
Wish to live—one item from the Suicide status form, O'Connor 2012 ²⁶	✓	—			—		✓
Attitude changes—increased motivation to live, Seike 2014 ¹²⁸	✓	—			—		✓
WTL, Mello 2016 ¹²⁹	✓		✓				✓
WTL scale, Carmel 2017 ³	✓	✓ ($\alpha = 0.83$)	✓		✓ (CFI = 0.99, RMSEA = 0.02)		✓
WTL, Gonzalez 2017 ¹³³	✓	—			—		✓
WTELS scale, Kira 2020 ²⁰	✓	✓ ($\alpha = 0.82$)	✓ ($r = 0.94$)	✓	✓ (CFI = 0.98, RMSEA = 0.07)		✓

WTL = will to live; α = Cronbach's alpha; CFI = comparative fit index; RMSEA = root mean square error of approximation; r = Pearson's correlation coefficient.

✓, available; —, not applicable; and blank cells mean that information is not available.

Psychometric properties are defined according to the COnsensus-based Standards for the selection of health Measurement Instruments taxonomy.¹⁵

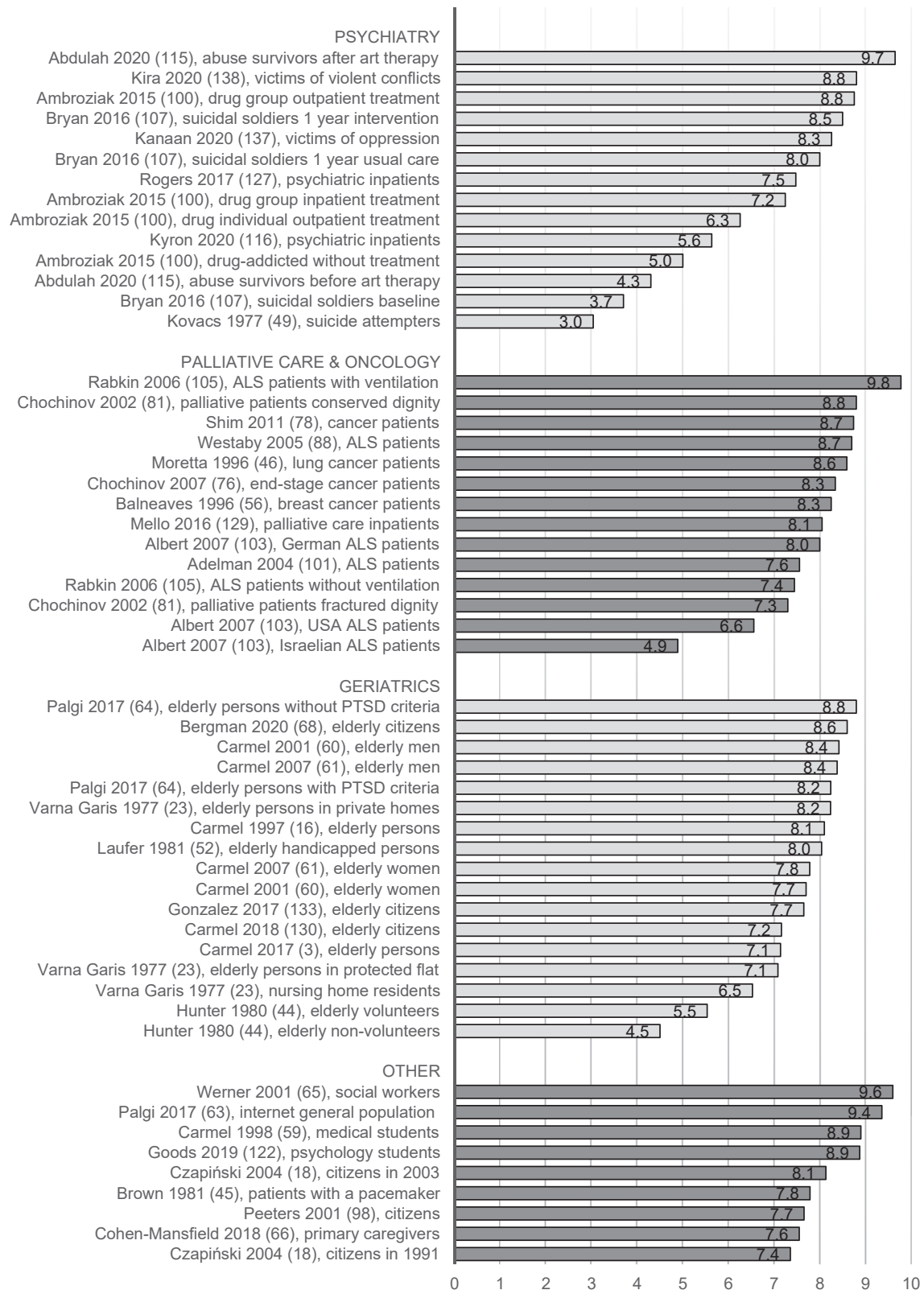


Fig. 2. Overview of the intensity of the will to live. Each line presents an average will to live score from one setting. Scores are weighted into a scale from 0 to 10.

explained by the reinventing the wheel phenomena, that is, the temptation to present old research ideas as novel ones, whether intentionally or unintentionally.³² These instances of bibliographic negligence are a global problem of research, a point further illustrated by the present study.³³

Without explicitly naming it, many studies allude to the psychoanalytical concept of life instinct, as described by Freud:³⁴ “Eros operates from the beginning of life and appears as a ‘life instinct’ in opposition to the ‘death instinct’ which was brought into being by the coming to life of inorganic substance. ... These two instincts were struggling with each other from the very first.” In this description, life instinct is not survival alone but rather something antecedent even to survival: a drive to combine elements into more complex unities.³⁵ No study cites the philosopher Schopenhauer, who already mentioned the term WTL in 1819.³⁶ For their part, Czapiński and Panek¹⁸ also highlighted the central importance of WTL: “our deepest level of well-being [is] the WTL.” Carmel³ cautions that WTL is not limited to a life instinct: another important contributor is “a cognitive-emotional facet influenced by each person’s personality and sociocultural environment.” Overall, the various proposed theoretical models move quite consistently in the same direction, even if they have distinct wordings. The theoretical model from Carmel’s research group quoted in the introduction offers a comprehensive conceptualization of WTL.⁴

Concerning the quality of the instruments described, we noticed there was generally little information available about psychometric properties and significant limitations in the development of the various instruments. However, this lack of psychometric data is not unusual, especially for themes that do not have widely shared definitions. For example, the same observation has been made regarding assessments of professional identity, interprofessionalism, and upper-extremity motor function.^{37–39} Furthermore, even when the relevant information is available, its validation may only pertain to a specific context, and the validation process would need to be conducted again if the instrument is used in another setting.

Intensity of WTL and Associated Factors

WTL is high even in settings characterized by significant suffering such as palliative or psychiatric care. This finding supports the argument that WTL is a dimension at the very core of a person’s being that is only partially influenced by internal and external factors. It is also reminiscent of the disability paradox where people with significant functional limitations and illnesses may still report a high quality of life.⁴⁰

The number and diversity of factors associated with WTL is significant, making it a pertinent concept for

researchers in numerous areas. These associated factors also suggest that WTL is a key concept that—like quality of life—is at the very core of a person and is the summation of his or her biopsychosociospiritual dimensions.⁴¹ It is therefore unsurprising that the weakest associations for WTL are educational and economic status, whereas the strongest associations are psychological variables such as resilience and life satisfaction.

Implications for Practice

Based on the data gathered in this review and to improve its acceptability and ease of use for a broad range of people, the use of a single-item instrument would appear to be the method of choice for assessing WTL in a clinical and research context. For consensus purposes, we suggest the wording listed in the table later, which is based on the various single-item instruments identified in our review and strives to maximize ease of understanding.

Please rate your current will to live on the following scale from 0 to 10, where 0 corresponds to *no will to live at all*, and 10 corresponds to the *strongest possible will to live*.

0	1	2	3	4	5	6	7	8	9	10
No will to live at all									Strongest possible will to live	

In a clinical context, we hypothesize that filling out this scale may be a useful conversation starter on this complex topic and may help the psychosocial team identify specific areas for intervention. In a research context, conducting qualitative interviews after patients complete the single-item questionnaire may help deepen researchers’ understanding of patients’ views on this concept.

Strengths and Limitations

One strength of this scoping review is the broadness of the literature search, which identified relevant studies published during a 50-year period.

One limitation of this study is the possibility that the concept of WTL can be expressed in many ways, some of which might have escaped our search. Single author screening and single author data extraction is another limitation.

Conclusion

During a 50-year period, numerous studies have attempted to provide a valid assessment method for

WTL without referencing one another, and no consensus exists on this topic. At a time when experts increasingly advocate for resource-oriented approaches to care, the concept of WTL may have important clinical implications, especially at the intersection of geriatrics and palliative care where patients' WTL is often weakened.⁴² Therefore, further research to establish a consensus on WTL assessment in clinical practice and to develop WTL-based interventions is warranted.

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Appendix I. Bibliographic database search strategies

Databases are listed in the order in which records were imported into Endnote.

PubMed

"life engagement"[tiab] OR "wish to live"[tiab] OR "will to live"[tiab]

- 303 references found (302 after deduplication)

Embase.com

((life NEAR/2 engagement) OR "wish* to live" OR "wish* for life" OR "wish* for liv*" OR "will* to live" OR "will* to survive" OR "desire to life" OR "desire for life" OR "Life desire" OR "Desire to continue liv*" OR "Desire to continue to live" OR "Desire to continue life" OR "desire to go on living" OR "attachment to life" OR "Motivation to live" OR "motivation to continue living" OR "will to exist live"):ab,ti,kw.

- 840 references found (576 after deduplication)

Cochrane Library Wiley

(Cochrane Database of Systematic Reviews and Cochrane Central Register of Controlled Trials, Issue 8 of 12, August 2020)

((life NEAR/1 engagement) OR (wish* NEXT to NEXT live) OR (wish* NEXT for NEXT life) OR (wish* NEXT for NEXT liv*) OR (will* NEXT to NEXT live) OR (will* NEXT to NEXT survive) OR "desire to life" OR "desire for life" OR "Life desire" OR "Desire to continue liv*" OR "Desire to continue to live" OR "Desire to continue life" OR "desire to go on living" OR "attachment to life" OR "Motivation to live" OR "motivation to continue living" OR "will to exist live"):ab,ti,kw.

- 31 references found (10 after deduplication)

Web of Science—Core collection

TS=((life NEAR/1 engagement) OR "wish* to live" OR "wish* for life" OR "wish* for liv*" OR "will* to live" OR "will* to survive" OR "desire to life" OR "desire for life" OR "Life desire" OR "Desire to continue liv*" OR "Desire to continue to live" OR "Desire to continue life" OR "desire to go on living" OR "attachment to life" OR "Motivation to live" OR "motivation to continue living" OR "will to exist live")

The core collection includes the following databases: Science Citation Index Expanded

(1900–present), Social Sciences Citation Index (1900–present), Arts & Humanities Citation Index (1975–present), Conference Proceedings Citation Index—Science (1990–present), Conference Proceedings Citation Index—Social Science & Humanities (1990–present), Book Citation Index—Science (2005–present), Book Citation Index—Social Sciences & Humanities (2005–present), Emerging Sources Citation Index (2015–present), Current Chemical Reactions (1985–present) (includes Institut National de la Propriete Industrielle structure data back to 1840), Index Chemicus (1993–present)

- 1040 references found (550 after deduplication)

APA PsycInfo Ovid

(1806 to August Week 1, 2020)

((life ADJ2 engagement) OR "wish* to live" OR "wish* for life" OR "wish* for liv*" OR "will* to live" OR "will* to survive" OR "desire to life" OR "desire for life" OR "Life desire" OR "Desire to continue liv*" OR "Desire to continue to live" OR "Desire to continue life" OR "desire to go on living" OR "attachment to life" OR "Motivation to live" OR "motivation to continue living" OR "will to exist live").ab,ti.

- 1384 references found (941 after deduplication)

CINAHL With Full Text—EBSCO

TI((life ADJ1 engagement) OR "wish* to live" OR "wish* for life" OR "wish* for liv*" OR "will* to live" OR "will* to survive" OR "desire to life" OR "desire for life" OR "Life desire" OR "Desire to continue liv*" OR "Desire to continue to live" OR "Desire to continue life" OR "desire to go on living" OR "attachment to life" OR "Motivation to live" OR "motivation to continue living" OR "will to exist live") OR AB((life ADJ1 engagement) OR "wish* to live" OR "wish* for life" OR "wish* for liv*" OR "will* to live" OR "will* to survive" OR "desire to life" OR "desire for life" OR "Life desire" OR "Desire to continue liv*" OR "Desire to continue to live" OR "Desire to continue life" OR "desire to go on living" OR "attachment to life" OR "Motivation to live" OR "motivation to continue living" OR "will to exist live")

- 428 references found (200 after deduplication)

ProQuest Dissertations and Theses A&I

TI,AB((life NEAR/1 engagement) OR "wish* to live" OR "wish* for life" OR "wish* for liv*" OR "will*

to live" OR "will* to survive" OR "desire to life" OR "desire for life" OR "Life desire" OR "Desire to continue liv*" OR "Desire to continue to live" OR "Desire to continue life" OR "desire to go on living"

OR "attachment to life" OR "Motivation to live" OR "motivation to continue living" OR "will to exist live")

- 329 references found (323 after deduplication)

Appendix Table 1
Content of Instruments to Assess the WTL and Theoretical Model of the WTL

Reference	Instrument Content	Theoretical Model of WTL
WTL scale, Ellison 1969 ²¹	Sometimes, I look forward to passing on. You sometimes can't help wondering whether anything is worthwhile anymore. After all our friends and relatives have passed on, we might as well be gone too. Sometimes, it would be better to be gone and away from it all. At my age, continuing to live is not so important. There are times when most of us wish our lives were over. Would you say you feel this way? Some people say they want to live very much. Others say they would rather be gone. How do you feel about this?	Discriminate persons who want to live from those for whom continued life is less attractive. Item 2 was borrowed from another study, where it was used as an indicator of 'latent suicide tendency'.
Wish to Live Sliding Scale, Kovacs 1975 ²²	Cardboard with a movable arrow, labeled 'I wish to live to the following extent'. The numbers on the scale ranged from 0 (labeled 'not at all') to 8 (labeled 'very much').	Suicidal person experiences an internal debate, a 'struggle' between the desire for death and the desire for life. ⁴⁹
Self-rating WTL scale, Varna Garis 1977 ²³	The human will has been said to be a strong force in people's lives, helping them through very difficult situations, helping them accomplish goals which they ordinarily would not have been able to achieve. With 100 being the most 'will' anyone could have, and 0 being the least, how much 'will' would you say that you have at the present time? <i>Place an 'X' at the appropriate spot on the line.</i>	The WTL, although commonly accepted as existing and as having an important role in peoples' lives, has been neither clearly defined nor empirically investigated. ... Hutschnecker's ²⁷ understanding of the WTL appears to be an analytic one involving two instincts: eros, a positive-creative instinct, and thanatos, a destructive or death-instinct
WTL, Weiher 1989 ⁵³	As before, 1 to 7 Likert type scales were used to measure this variable. ... One signified little or no WTL and seven very strong WTL.	Greer et al. ¹⁴⁰ presented evidence to suggest that patients who showed greater 'fighting spirit' or WTL survived longer than those who showed less. Doctors and other health care professionals have provided some anecdotal evidence which corroborate this concept. Another goal of this study was to see whether or not the global concept of WTL has any predictive value when one considers this group of patients with malignant melanoma. ... Specific hypotheses to be tested: those patients who exhibit a greater sense of WTL will survive longer than those who do not.
WTL, Katz 1989 ⁵⁴	NA	An intriguing but poorly understood phenomenon, the patient's WTL. ²⁷
WTL scale, Yates 1993 ⁵⁵	I'm going to beat it regardless I'm hoping the treatments will work a cure I'm prepared to have any treatment to get better I am optimistic and hopeful If my current treatment doesn't work I will find something that does I'm determined to beat this I desperately want to live I have a lot to live for My family wants me to have the treatments I really don't care anymore whether I live or die I don't care how uncomfortable the treatment I will have it if it improves my chances It's worth having the treatments even if the chances they will work may not be high I will hang on to life at any cost <i>1 = strongly agree; 2 = agree; 3 = unsure; 4 = disagree; 5 = strongly disagree</i>	Respondents' optimism and perceived ability to overcome their cancer. ... Intended to distinguish respondents on the extent to which they feel strongly about surviving their cancer. ... A scale measuring strength of WTL. This scale is derived from previous unpublished works. ^{141,142}

(Continued)

Appendix Table 1
Continued

Reference	Instrument Content	Theoretical Model of WTL
WTL, Fox 1994 ⁵⁸	NA	A subjective assessment made by nursing staff and physiotherapists, but previously identified by Reno and Burlington ¹⁴³ as 'morale and ambition'.
WTL, Carmel 1997 ¹⁶	If you could describe your WTL, on a scale of 0 to 5, would you say that it is: 5 = <i>very strong</i> ; 4 = <i>strong</i> ; 3 = <i>intermediate</i> ; 2 = <i>weak</i> ; 1 = <i>very weak</i> ; 0 = <i>no WTL</i> ?	An unstudied factor which may contribute to the understanding of [the use of life-sustaining treatments] is the strength of a person's WTL. ... To the best of our knowledge, the WTL is introduced and analyzed for the first time in this study. ... The WTL is probably an outcome of people's perceptions of the meaning and quality of their lives.
Wish to live, McMillan 1997 ⁶⁹	After simple cognitive tests, explicitly asking whether she wanted to live (3 questions not available). Buzzer system to indicate yes/no. Assessment repeated several times.	Wish not the tube to be removed and wish to continue living. Author was asked by the Supreme Court to give an opinion about cognitive status and the patients's ability to form an opinion about WTL.
WTL Visual Analogue Scale, Chochinov 1999 ¹⁰	WTL visual analogue scale, with 'complete will to live' and 'no will to live' as the extremes.	No previous studies have specifically examined the issue of WTL per se. ... The ability of clinicians and researchers to understand and track WTL as an outcome measure in this vulnerable population will no doubt lead to better palliative care for patients approaching death.
WTL—attachment to life, Albert 1999 ¹⁷	Do you have a strong WTL? Do you find meaning in your life? Do you have something to look forward to each day? Do you expect to accomplish long-term goals? Do you continue to look to the future? Would you be bothered if your life ended soon?	The measure was designed to try to assess a patient's desire to live despite potentially poor quality of life.
WTL measure, Levy 2002 ⁸⁹	Below is a list of adjectives that can be used to describe a person's life. For each line, check the one box that best describes what you think about your life in retirement.	On the basis of our prior research and the research of others, we predicted that if self-perceptions of aging affect survival, the underlying mechanism would be, in part, through WTL. We define WTL as a judgment that the perceived benefits of one's life outweigh the perceived hardships. ... Our WTL measure was developed from three items appearing in a 14-item semantic differential measure that was included in the 1977 wave of follow-up data collection. The responses consisted of paired words on opposite ends of a 7-point scale. The three semantic differential items we selected included the following pairs of adjectives: empty—full, hopeless—hopeful, and worthless—worthy. These adjectives seemed to closely correspond to our earlier-stated definitions of will to die and WTL, respectively. That is, when the perceived hardships of one's life outweigh the perceived benefits, we expect an outlook that is empty, hopeless, and worthless, whereas when the perceived benefits of one's life outweigh the perceived hardships, we expect an outlook that is full, hopeful, and worthy.

(Continued)

Appendix Table 1
Continued

Reference	Instrument Content	Theoretical Model of WTL
Willingness to live, Czapiński 2004 ¹⁸	At present, how strong is your willingness to live? Please cross the appropriate box on the scale below. <i>1 = I do not want to live at all; 10 = I want to live very strong.</i>	Moreover, following 'the onion theory of happiness', ¹⁴⁴ we included two more indicators of the psychological well-being that were deeper than those previously used – the WTL (suicidal tendencies – question 43) and the desire to live – question 56), conditioning over a longer time period one's resistance to a situation-dependent worsening of subjective well-being. ... Our deepest level of well-being [is] the WTL.
WTL Visual Analogue Scale, Adelman 2004 ¹⁰¹	Visual analogue scale	NA
WTL scale, Beadle 2004 ¹⁹	I am going to beat this regardless I am determined to beat this I desperately want to live I have a lot to live for I will hang on to life at any cost	Patients with advanced cancer frequently express positive attitudes and can be unduly optimistic about the potential benefits of treatment. In order to evaluate an illusory domain in the context of advanced cancer, we developed (i) a scale of WTL and (ii) characterized the beliefs that patients held about the curability of their cancer, and (iii) how committed they were to using alternative treatments. A measure of quality of life was used as the dependent variable in order to assess the association between these attributes. ... A five item adapted version of the 13-item WTL scale, a previously published scale. ⁵⁵ These five items were selected after factor analysis of the original 13-item scales suggested two possible sub-scales - an eight item series of statements indicating a willingness of patients to have treatment in order to survive a cancer, and a five-item scale which was more representative of the core concept of WTL.
Wish to live—first item from the Scale for Suicide Ideation, Brown 2005 ²⁴	Please circle the statement that best describes how you have been feeling over the past week: <i>I have a moderate to strong wish to live; I have a weak wish to live; I have no wish to live.</i>	Motivation to commit suicide is often complex and involves considerable ambivalence and that suicidal individuals often experience an internal struggle between wanting to live and wanting to die. To test this observation, Kovacs ⁴⁹ administered separate measures of the wish to live and the wish to die to patients hospitalized after a suicide attempt. ... There has been a paucity of research that has attempted to replicate these findings or to explore the internal struggle of suicidal individuals. ... The Scale for Suicide Ideation includes [one] item that assess the wish to live.
WTL numerical analogue format, Crawford 2008 ¹¹⁸	Single-item self-reported rating of WTL.	Custom-designed ... rating
Wish to live—first item from the Yale Evaluation of Suicidality Scale, Lichtenthal 2009 ²⁵	In light of [your most distressing experience in the past year], how strong would you say your wish to live has been? <i>Strong; moderate; weak; have none.</i>	The 13-item Yale Evaluation of Suicidality scale, which has been demonstrated as a valid and reliable measure of suicidality. ... first item, which asked patients to evaluate the strength of their wish to live ... in light of their current circumstances.
WTL, Brocks 2011 ¹²³	What are your personal reasons for taking up the challenge of an aortic valve operation? Please add further reasons if necessary. ... I want to live. <i>Very true; something applies; less true; strongly disagree.</i>	NA

(Continued)

Appendix Table 1
Continued

Reference	Instrument Content	Theoretical Model of WTL
Wish to live—one item from the Suicide status form, O'Connor 2012 ²⁶	I wish to live to the following extent. <i>1 = not at all; 7 = very much.</i>	Both historical and recent research suggests that the notion of ambivalence about the wish to live and to die underlies much of the variability seen among people who contemplate suicide. ... To this end, Kovacs and Beck developed the 'internal struggle hypothesis' (ISH) to describe many suicidal individuals' simultaneous wish to live and wish to die. ... The current study used the wish to live and wish to die rating scales on the SSF.
Attitude changes—Increased motivation to live, Seike 2014 ¹²⁸	Program content linked to improvement in future life and increase in motivation to live. <i>Completely disagree; disagree somewhat; cannot say either way; agree considerably; agree very much.</i>	After completion of the program, we examined participants' learning needs and attitude changes for each domain, using four items: ... degree of improvement in future life and increase in incentive for care.
WTL, Mello 2016 ¹²⁹	Definition: Desire, determination, and effort to survive. Indicators: (a) expression of determination to live, (b) expression of hope. <i>1 = severely compromised; 2 = substantially compromised; 3 = moderately compromised; 4 = mildly compromised; 5 = not compromised.</i>	Nursing outcome and indicators selected from Nursing Outcomes Classification (NOC) ¹⁴⁵ listings by nurses specialized in palliative care. ... Will to live with expression of determination to live and hope as an indicator
WTL scale, Carmel 2017 ³	In your current condition, would you want to continue living for many years? <i>Certainly, yes; I think I would; I don't know; I think that not; Certainly not; I have no WTL.</i> In comparison to people your age, how would you evaluate your WTL? <i>Much stronger; stronger; not stronger and not weaker; weaker; much weaker; I have no WTL.</i> How would you evaluate your WTL today, in comparison to what it was when you were younger? <i>Much stronger; stronger; as it was when I was younger; weaker; much weaker; I have no WTL.</i> If you would evaluate your WTL on a scale from 0 to 5, would you say it is: <i>The strongest possible; strong; intermediate; weak; very weak; I have no WTL.</i> In the last year, would you say that your WTL: <i>Became much stronger; became stronger; has not changed; weakened; much weakened; I had no WTL.</i>	Striving for continued existence is a basic instinct and a natural driving force of all living beings. For humans, this existential drive has a cognitive-emotional facet influenced by each person's personality and socio-cultural environment. These two interwoven phases are expressed in the WTL concept. ⁶⁰ According to previous studies, elderly people have the ability to assess the strength of both of these phases and willingly rank the strength of their WTL. ⁶⁰
WTL, Gonzalez 2017 ¹³³	How often do you think the benefits of living outweigh/offset the adversities of life? <i>1 = hardly ever; 5 = almost always.</i>	This study included predictors from different areas (socioeconomic, physical execution, and emotional), mixing some predictors that have been widely studied and have consistently demonstrated their predictive value for cognitive functioning ... and others that have been less well studied (e.g. emotional variables such as the WTL or satisfaction with aging) and not previously studied together with other variables. ... Questions specifically created for this study, and asking whether the benefits of living outweigh/compensate misfortunes in life.
WTELS scale, Kira 2020 ²⁰		

(Continued)

Appendix Table 1
Continued

Reference	Instrument Content	Theoretical Model of WTL
	<p>Will to exist, live and survive (WTELS) is the expression of a natural instinct of beings and existing and growing fighting for self-fulfillment and striving for a life worth living as you see it. WTELS is the determination to exist physically, personally, and collectively (socially), by continue living (not dying), and as an independent autonomous actor, with the social and economic status he or she desires, and as an intricate part of any of different groups (e.g., religious, ethnic, and cultural group) that are well respected. The goal of these questions is to know how much this WTL as defined here means to you. <i>Please rate the following statements on a scale of 0–5 according to your personal experience and feelings.</i></p> <p>My will to exist and live is generally.</p> <p>My will to exist and survive adversity is generally. 5 = very strong; 4 = strong; 3 = neutral; 2 = drained/depleted; 1 = extremely depleted; 0 = I have no will to live/survive.</p> <p>When I have experienced significant adversity in my life, I have become even more determined to succeed and thrive. I managed the adversities because I have a strong will to exist and to prove myself.</p> <p>I am motivated to achieve my goals in life by a drive to exist, live and win.</p> <p>I live a meaningful life. 5 = very much agree; 4 = agree; 3 = I am not sure; 2 = somewhat disagree; 1 = completely disagree.</p> <p>Please evaluate your WTL on a scale from 0 to 5, would you say that it is: 5 = very strong; 4 = strong; 3 = neutral; 2 = weak; 1 = very weak; 0 = I have no WTL.</p>	<p>'Will-to Exist-Live and Survive' (WTELS) was taken for granted for long and is a missing important conscious and unconscious factor in the fighting for justice and resisting oppression. WTELS is the drive, tenacity, and volition (determination and persistence) to exist, live, survive (to continue living), and thrive. The concept of WTELS, we propose here, is a development of the limited previously introduced WTL that emerged in the studies of aging and terminal illness,⁶² and 'will to survive' that emerged in the study of oppression in Palestinian adolescents (Kira, Lewandowski, Chiodo, & Ibrahim, 2014).</p>

WTL = will to live; NA = not available; WTELS = will to exist, live, and survive.
The table presents verbatim quotations. Each reference is indicated in the first column.





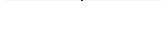

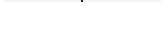
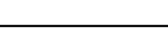
Appendix Table 2
Extent of Association With the WTL

Domain	Factor	Measurement	WTL Instrument Used	Statistical Indicator	<i>P</i>	-1	0	1	Reference	
General	Prognosis	Subjective nearness to death	16	$r = 0.26-0.35$					64	
		Quality of life	21	$r = -0.50$	<0.001				46	
	Quality of life	Quality of Life Scale	10	$r = 0.210$	0.002				82	
			16	$r = 0.512$	<0.001				67	
		19	$sr^2 = 0.18$					19		
		Self-rated health	Cantril ladder	21	$r = -0.309$					45
				3	$r = -0.10$	<0.01				4
			Perceived health	21	$\tau = 0.32$	<0.01				21
		16		$r = 0.448$	<0.001				67	
	Successful aging	Self-Rated Health Single-Item Scale	3	$r = 0.36-0.38$					3	
			3	$r = 0.368$	<0.05				130	
	Biological	Age	Age	3	$r = -0.10$	<0.001				4
				21	$r = 0.05$	>0.05				46
16				$r = -0.15$	<0.01				62	

(Continued)

Appendix Table 2
Continued

Domain	Factor	Measurement	WTL Instrument Used	Statistical Indicator	P	-1	0	1	Reference
			16	$r = -0.25$	<0.001				68
			17	$r = -0.24$	<0.01				88
			18	$r = -0.19$	>0.05				97
			3	$r = -0.110$	<0.05				130
			3	$r = -0.18$	>0.05				132
		Subjective age	16	$r = -0.49$	<0.001				68
	Functional status	Activities of daily living disability	3	$r = -0.18$	<0.001				4
		ALS disability severity	17	$r = -0.07$	>0.05				88
		ALS patients accessibility of travel	17	$r = 0.36$	<0.01				88
		Instrumental activities of daily living disability	3	$r = -0.26$	<0.001				4
		Katz activities of daily living	10	$r = 0.020$	0.78				82
	Sex	Gender	17	$r = 0.00$	>0.05				88
		Male	16	$r = -0.09$	<0.01				68
		Women	3	$r = -0.17$	<0.001				4
	State	Body mass index	3	$r = 0.18$	>0.05				132
		Chronic diseases	16	$r = -0.14$	<0.01				62

		Cancer duration	18	$r = -0.37$ to -0.40			97	
		Ethnic minority	17	$r = 0.00$	>0.05		88	
		Length from ALS diagnosis	17	$r = 0.11$	>0.05		88	
		Physical illness	16	$r = -0.28$	<0.001		68	
		Poor Physical Health Scale	20	$r = -0.08$	<0.001		138	
Symptoms		Edmonton Symptom Assessment System	10	$r = 0.33-0.37$	<0.05		10	
			10	$r_s = 0.8484$	<0.0001		73	
		Number of symptoms	21	$r = 0.230$			45	
		Pain symptoms	3	$r = -0.23$	<0.001		4	
		Patient health questionnaire	16	$r = -0.35$	<0.001		63	
		Somatic symptoms	16	$r = -0.24$	<0.0001		62	
		Symptom distress	10	$r = -0.17$	0.012		77	
		Symptom Distress Scale	10	$r = 0.032-0.329$	<0.001 to >0.05		82	
	Psychological	Anxiety	Edmonton Symptom Assessment System	10	$r = 0.3$	<0.001		10
			Existential annihilation anxiety	20	$r = -0.26$	<0.01		135
			20	$r = -0.07$	>0.05		137	

(Continued)

Appendix Table 2
Continued

Domain	Factor	Measurement	WTL Instrument Used	Statistical Indicator	<i>P</i>	-1	0	1	Reference
			20	$r = -0.29$	<0.001				139
	Cognition	Cognitive impairments of six items	16	$r = -0.28$	<0.001				68
	Control	Health locus of control	21	$r = 0.292$					45
		Locus of Control Scale	23	$r = -0.249$					23
		Pearlin and Scouler's Mastery Scale	21	$r = 0.32$	<0.01				46
	Depression	Beck Depression Inventory	22	$r = -0.57$	<0.001				22
			23	$r = -0.233$					23
		Center for Epidemiologic Studies—Depression Scale	16	$r = -0.51$	<0.001				68
			21	$r = 0.61$	<0.001				46
			22	$r = -0.59$	<0.0001				51
		Edmonton Symptom Assessment System	10	$r = 0.37- 0.49$	<0.003—<0.001				10
		Geriatric Depression Scale	3	$r = -0.46$ to -0.55					3
			3	$r = -0.49$	<0.001				4
			118	$r = -0.01$ to -0.63	>0.5—<0.001				118
			3	$r = -0.433$	<0.05				130

	Structured clinical interview for the DSM-IV	25	$r_s = -0.17$	<0.002		120
Distress	Five-item daily symptom index	24	$r = -0.60$	<0.001		116
Happiness	Happiness four-item scale	3	$r = 0.45-0.48$			3
Involvement	Adherence to a cardiac rehabilitation program	3	$r = -0.33$	<0.001		132
	Dignity therapy	10	$r = 0.387$	<0.0001		74
	Life-sustaining treatment decisions	16	$r = 0.27$	<0.05		65
	Purpose in life inventory	23	$r = -0.266$			23
		23	$r = 0.39-0.42$	<0.02		52
	Purpose in Life Scale	18	$r = 0.42$	<0.05		97
	Wish to prolong life	16	$r_s = 0.19-0.37$	<0.05		60
Life satisfaction	Cantril ladder	18	$r = 0.26-0.47$			97
	Life satisfaction index	21	$r = -0.554$			43
	Life satisfaction	16	$r = 0.38$	<0.0001		62
	Life Satisfaction Index A and Satisfaction With Life Scale	3	$r = 0.43-0.51$			3
Morale	Demoralization Scale	25	$r_s = -0.33$			120

(Continued)

Appendix Table 2
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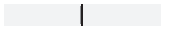














Domain	Factor	Measurement	WTL Instrument Used	Statistical Indicator	P	-1	0	1	Reference
		Neuroticism brief questionnaire	10	$r = -0.211$	0.003				75
		Philadelphia Geriatric Center Positive Morale Scale	3	$r = 0.40-0.52$					3
Resilience		Connor-Davidson Resilience Scale	20	$r = 0.63$	<0.001				137
			20	$r = 0.23$	<0.001				138
		Herth hope index	18	$r = 0.20$	>0.05				97
		Hopelessness Scale	22	$r = -0.74$	<0.001				22
		Outcome of event	21	$r = -0.20$	>0.05				46
Self-esteem		Stanford inventory of cancer patient adjustment	21	$r = -0.39$	<0.01				46
		Rosenberg Self-Esteem Scale	20	$r = 0.43$	<0.001				135
		Sense of dignity	10	$r = 0.207$	0.003				82
Self-stigma		Internal stigma of mental illness	118	$r = -0.405$	<0.001				119
Sleep		Insomnia severity index	118	$r = -0.285$	<0.001				119
Suicide		Acute suicidal affective disturbance	26	$r = -0.32$					127
		Beck Scale for Suicide Ideation	118	$r = -0.636$	<0.001				119
		Current Suicidal Intent Scale	22	$r = -0.76$	<0.001				22

	Death/life implicit association test	118	$r = -0.198$	<0.001		119
	History of suicidal attempts	118	$r = -0.248$	<0.001		119
	Internal suicide debate	22	$r = -0.55$	<0.0001		51
	Prior self-arm	24	$r = -0.19$	<0.001		116
	Suicidal behaviors questionnaire	22	$r = -0.56$	<0.0001		51
Trauma	Clinician-administered Post-Traumatic Stress Disorder Scale	20	$r = -0.23$	<0.001		135
		20	$r = -0.47$	<0.001		137
		20	$r = -0.36$	<0.001		138
	Cumulative Stress and Trauma Scale	20	$r = -0.18$	<0.05		137
		20	$r = -0.11$	<0.001		138
	Perceived life threat of cancer	21	$r = 0.24$	<0.05		46
	Perceived threat to self-esteem of cancer	21	$r = 0.21$	>0.05		46
	Post-traumatic growth inventory	20	$r = 0.18$	<0.001		135
		20	$r = 0.57$	<0.001		137
		20	$r = 0.021$	<0.001		138
Wish to die	Desire for death	10	$r = -0.427$	<0.005		82

(Continued)

Appendix Table 2
Continued

Domain	Factor	Measurement	WTL Instrument Used	Statistical Indicator	<i>P</i>	-1	0	1	Reference
		Schedule of attitudes toward hastened death	10	$r_s = -0.164$	0.079				78
		Wish to die single item	24	$r = -0.64$	<0.001				116
			118	$r = -0.814$	<0.001				119
		Wish to Die Sliding Scale	22	$r = -0.57$	<0.001				49
			22	$r = -0.80$	<0.0001				51
Social	Activities	ALS patients' intention to work	17	$r = 0.19$	<0.05				88
		Employment status	17	$r = 0.02$	>0.05				88
		Loss of Function Scale	21	$\tau = 0.43$	<0.01				21
		Olympic games viewing	16	$r = 0.11$	0.201				63
		Philip's social participation index	21	$r = -0.219$					45
		Vocational preference inventory—artistic	23	$r = -0.47$	<0.01				52
		Vocational preference inventory—intellectual	23	$r = 0.58$	<0.01				52
	Burden to others	Perceived burdensomeness	24	$r = -0.61$	<0.001				116
			118	$r = -0.549$	<0.001				119
		Visual Analogue Scale	10	$r = -0.30$	0.0001				76
	Couple	Married	3	$r = 0.21$	<0.001				4

		21	$r = -0.276$			45
		17	$r = -0.01$	>0.05		88
	Not in a relationship	16	$r = 0.19$	<0.001		68
Help-seeking	General help seeking questionnaire	118	$r = 0.354$	<0.001		119
Identity	Identity Salience Scale	20	$r = 0.00$	>0.01		138
Isolation	Dean's Social Isolation Subscale	21	$\tau = 0.36$	<0.01		21
		21	$r = -0.469$			43
	Number of friends	18	$r = 0.36$	<0.05		97
Judgment	Brief Fear of Negative Evaluation Scale	118	$r = -0.041$	>0.05		119
Loneliness	Loneliness Four-Item Scale	3	$r = -0.28$ to -0.30			3
	Thwarted belongingness	24	$r = -0.45$	<0.001		116
Status	Economic Status Single-Item Scale	3	$r = 0.17$	<0.001		4
		3	$r = 0.198$	<0.05		130
		16	$r = 0.19$	<0.001		68
	Education	3	$r = 0.10$	>0.05		4
		21	$r = 0.06$	>0.05		46

(Continued)

Appendix Table 2
Continued

Domain	Factor	Measurement	WTL Instrument Used	Statistical Indicator	<i>P</i>	-1	0	1	Reference
			17	$r = 0.10$	>0.05				88
			18	$r = 0.21$	>0.05				97
			3	$r_s = -0.008$	>0.05				130
			3	$r = -0.20$	>0.05				132
		Self-evaluation of material conditions	18	$r = 0.09$					93
Spiritual	Religiosity	Religiosity Scale	20	$r = 0.15$	<0.01				135
			20	$r = 0.11$	<0.001				138
	Spirituality	Interfaith Spirituality Scale	20	$r = 0.12$	<0.01				135
			20	$r = 0.31$	<0.001				137
			20	$r = 0.04$	>0.01				138
		Spiritual health and life-orientation measure	3	$r = 0.24$	<0.01				131

WTL = will to live; r = Pearson's correlation coefficient; sr^2 = semipartial correlation squared; r_s = Spearman's correlation coefficient; τ = Kendall's tau coefficient; ALS = amyotrophic lateral sclerosis; DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition).

For References ¹⁻¹³⁹, see the main document.

Factors have been identified from all studies where a WTL measurement has been used. The statistical indicator is presented as a number and in a bar chart.

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