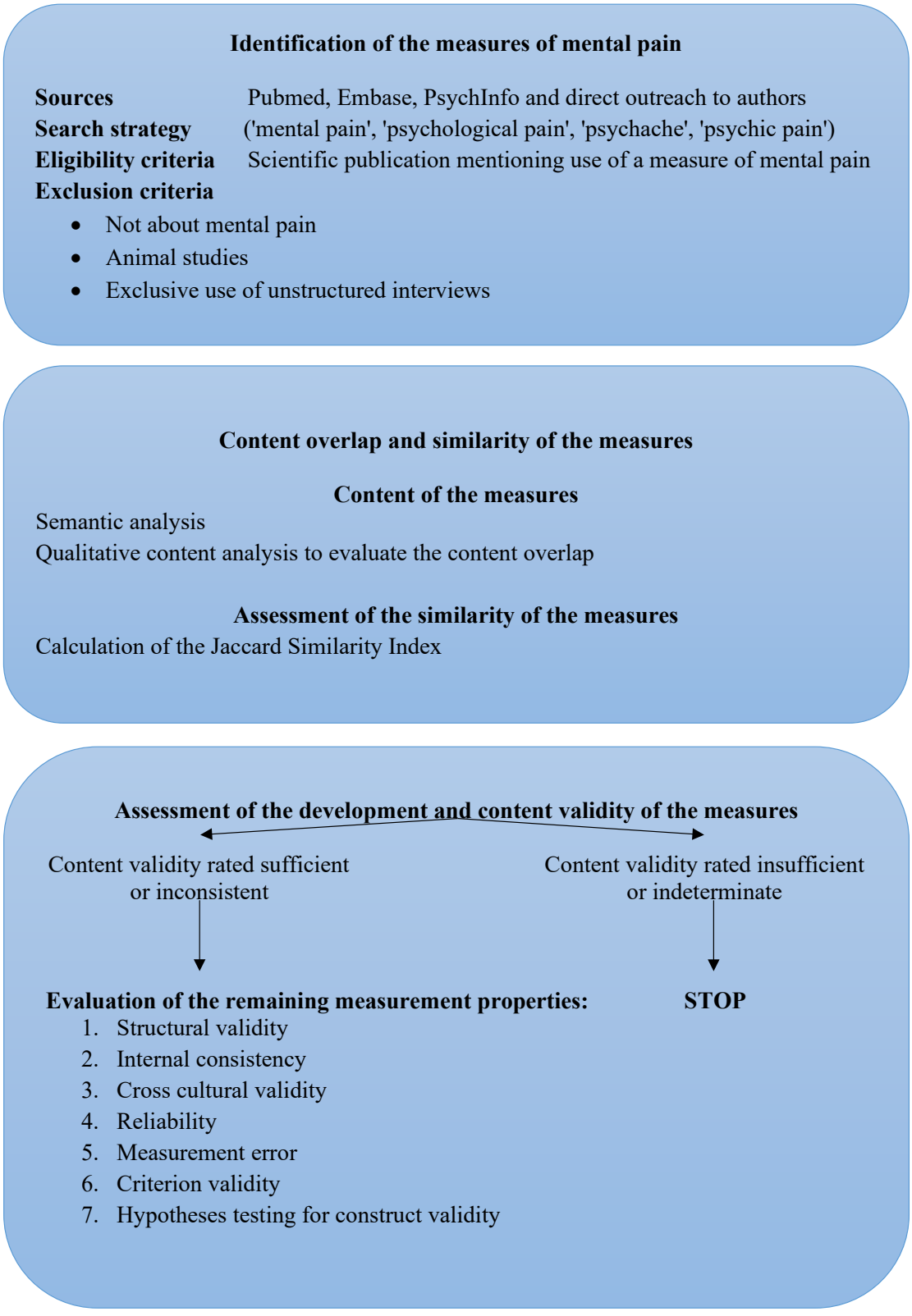
Supplementary material for Charvet et al. How to measure mental pain?

Supplementary material 1 – Global study flow chart



Supplementary material 2 – Search queries of the systematic review

We performed 2 searches:

- A first extraction on June 22 2020 (initial search)
- A second extraction on February 8 2022 (update required in the revision process)

PubMed: 'mental pain' [Title/Abstract] OR 'psychological pain' [Title/Abstract] OR psychache [Title/Abstract] OR 'psychic pain' [Title/Abstract] AND 'humans' [MeSH Terms]

EMBASE: 'mental pain':ab,ti OR 'psychological pain':ab,ti OR 'psychache':ab,ti OR 'psychic pain':ab,ti AND [humans]/lim

PsychINFO: 'mental pain':ab,ti OR 'psychological pain':ab,ti OR 'psychache':ab,ti OR 'psychic pain':ab,ti AND [humans]/lim

Charvet C, *et al. Evid Based Ment Health* 2022; 25:e4–e13. doi: 10.1136/ebmental-2021-300350

Supplementary material 3 – List of the 167 studies included in the systematic review

1 Abbar M, Demattei C, El-Hage W, *et al.* Ketamine for the acute treatment of severe suicidal ideation: double blind, randomised placebo controlled trial. *BMJ* 2022; **376**: e067194.

2 Alacreu-Crespo A, Cazals A, Courtet P, Olié E. Brief Assessment of Psychological Pain to Predict Suicidal Events at One Year in Depressed Patients. *Psychother Psychosom* 2020; **89**: 320–3.

3 Alacreu-Crespo A, Guillaume S, Richard-Devantoy S, Cazals A, Olié E, Courtet P. Clinical Dimensions Associated With Psychological Pain in Suicidal Patients: One-Year Follow-up Study. *J Clin Psychiatry* 2022; **83**: 21m14065.

4 Baeza-Velasco C, Guillaume S, Olié E, Alacreu-Crespo A, Cazals A, Courtet P. Decision-making in major depressive disorder: Subjective complaint, objective performance, and discrepancy between both. *J Affect Disord* 2020; **270**: 102–7.

5 Becker G, Orbach I, Mikulincer M, Iohan M, Gilboa-Schechtman E, Grossman-Giron A. Reexamining the Mental Pain-Suicidality Link in Adolescence: The Role of Tolerance for Mental Pain. *Suicide Life Threat Behav* 2019; **49**: 1072–84.

6 Berardelli I, Sarubbi S, Spagnoli A, *et al.* Projective Technique Testing Approach to the Understanding of Psychological Pain in Suicidal and Non-Suicidal Psychiatric Inpatients. *Int J Environ Res Public Health* 2019; **17**: E284.

7 Bohaterewicz B, Nowicka M, Sobczak AM, Plewka AA, Gaszczyk P, Marek T. Clinical and Psychosocial Characteristics of Adolescent Pediatric Patients Hospitalized after Different Types of Suicidal Behaviors-A Preliminary Study. *Int J Environ Res Public Health* 2020; **17**: E5568.

8 Bohaterewicz B, Sobczak AM, Krześniak A, Mętel D, Adamczyk P. On the relation of gyrification and cortical thickness alterations to the suicidal risk and mental pain in chronic schizophrenia outpatients. *Psychiatry Res Neuroimaging* 2021; **316**: 111343.

9 Bourn JR, Frantell KA, Miles JR. Internalized heterosexism, religious coping, and psychache in LGB young adults who identify as religious. *Psychology of Sexual Orientation and Gender Diversity* 2018; **5**: 303–12.

10 Brausch AM, O'Connor SS, Powers JT, McClay MM, Gregory JA, Jobes DA. Validating the Suicide Status Form for the Collaborative Assessment and Management of Suicidality in a Psychiatric Adolescent Sample. *Suicide Life Threat Behav* 2020; **50**: 263–76.

11 Cáceda R, Durand D, Cortes E, *et al.* Impulsive choice and psychological pain in acutely suicidal depressed patients. *Psychosom Med* 2014; **76**: 445–51.

12 Cáceda R, Griffin WST, Delgado PL. A probe in the connection between inflammation, cognition and suicide. *J Psychopharmacol* 2018; **32**: 482–8.

13 Cáceda R, James GA, Stowe ZN, Delgado PL, Kordsmeier N, Kilts CD. The neural correlates of low social integration as a risk factor for suicide. *Eur Arch Psychiatry Clin Neurosci* 2020; **270**: 619–31.

14 Cáceda R, Kim DJ, Carbajal JM, Hou W. The Experience of Pain is Strongly Associated With Poor Sleep Quality and Increased Risk for Suicide. *Arch Suicide Res* 2021; : 1–15.

15 Calati R, Romano D, Magliocca S, Madeddu F, Zeppegno P, Gramaglia C. The interpersonal-psychological theory of suicide and the role of psychological pain during the COVID-19 pandemic: A network analysis. *J Affect Disord* 2022; **302**: 435–9.

16 Campos RC, Gomes M, Holden RR, Piteira M, Rainha A. Does psychache mediate the relationship between general distress and suicide ideation? *Death Stud* 2017; **41**: 241–5.

17 Campos RC, Holden RR. Testing Models Relating Rejection, Depression, Interpersonal Needs, and Psychache to Suicide Risk in Nonclinical Individuals. *J Clin Psychol* 2015; **71**: 994–1003.

18 Campos RC, Holden RR. Psychological pain and previous suicide attempts in young adults: Results with the Portuguese version of the Psychache Scale. *J Clin Psychol* 2020; **76**: 1965–71.

19 Campos RC, Holden RR, Gomes M. Assessing psychache as a suicide risk variable: Data with the Portuguese version of the psychache scale. *Death Stud* 2019; **43**: 527–33.

20 Campos RC, Holden RR, Lambert CE. Avoidance of psychological pain and suicidal ideation in community samples: Replication across two countries and two languages. *J Clin Psychol* 2019; **75**: 2160–8.

21 Campos RC, Holden RR, Laranjeira P, *et al.* Self-report depressive symptoms do not directly predict suicidality in nonclinical individuals: Contributions toward a more psychosocial approach to suicide risk. *Death Stud* 2016; **40**: 335–49.

22 Campos RC, Holden RR, Santos S. Exposure to suicide in the family: Suicide risk and psychache in individuals who have lost a family member by suicide. *J Clin Psychol* 2018; **74**: 407–17.

23 Campos RC, Holden RR, Spínola J, Marques D, Lambert CE. Dimensionality of Suicide Behaviors: Results within Two Samples from Two Different Countries. *Omega (Westport)* 2021; **84**: 194–211.

24 Campos RC, Simões A, Costa S, Pio AS, Holden RR. Psychological pain and suicidal ideation in undergraduates: The role of pain avoidance. *Death Stud* 2020; **44**: 375–8.

25 Casanova MP, Nelson MC, Pickering MA, *et al.* Measuring psychological pain: psychometric analysis of the Orbach and Mikulincer Mental Pain Scale. *Measurement Instruments for the Social Sciences* 2021; **3**: 7.

26 Cavusoglu C, Ileri I, Tuna Dogrul R, *et al.* Relationship between psychological pain and death anxiety with comprehensive geriatric assessment in older adults. *Geriatr Gerontol Int* 2020; **20**: 1056–60.

27 Chin J, Holden RR. Multidimensional future time perspective as moderators of the relationships between suicide motivation, preparation, and its predictors. *Suicide Life Threat Behav* 2013; **43**: 395–405.

28 Chodkiewicz J. Polish adaptation of the Gotland Scale of Male Depression (GDMS) by Wolfgang Rutz. *Postępy Psychiatrii i Neurologii* 2017; **26**: 13–23.

29 Chodkiewicz J, Miniszewska J, Strzelczyk D, Gąsior K. Polish Adaptation of the Psychache Scale by Ronald Holden and Co-workers. *Psychiatr Pol* 2017; **51**: 369–81.

30 Conejero I, Olié E, Calati R, Ducasse D, Courtet P. Psychological Pain, Depression, and Suicide: Recent Evidences and Future Directions. *Curr Psychiatry Rep* 2018; **20**: 33.

31 Conrad AK, Jacoby AM, Jobes DA, *et al.* A psychometric investigation of the Suicide Status Form II with a psychiatric inpatient sample. *Suicide Life Threat Behav* 2009; **39**: 307–20.

32 Cosci F, Mansueto G, Benemei S, Chiarugi A, De Cesaris F, Sensky T. Mental pain as a global person-centered outcome measure. *CNS Spectr* 2021; : 1–7.

33 Cosci F, Svicher A, Mansueto G, *et al.* Mental pain and pain-proneness in patients with migraine: results from the PAINMIG cohort-study. *CNS Spectr* 2021; **26**: 491–500.

34 D'Agata M, Holden R. Self-concealment and perfectionistic self-presentation in concealment of psychache and suicide ideation. *Personality and Individual Differences* 2018; **125**: 56–61.

35 Dangel TJ, Webb JR, Hirsch JK. Forgiveness and Suicidal Behavior: Cynicism and Psychache as Serial Mediators. *J Psychol* 2018; **152**: 77–95.

36 Dangel T, Webb JR. Spirituality and psychological pain: The mediating role of social support. *Mental Health, Religion & Culture* 2017; **20**: 246–59.

37 Davis KC, Anderson JL. Psychological pain: A moderating factor between personality psychopathology and self-harm. *J Am Coll Health* 2021; : 1–9.

38 DeLisle M, Holden R. Differentiating Between Depression, Hopelessness, and Psychache in University Undergraduates. *Measurement and Evaluation in Counseling and Development - MEAS EVAL COUNS DEVELOP* 2009; **42**: 46–63.

39 Demirkol ME, Namlı Z, Eriş Davul Ö, Karaytuğ MO, Tamam L, Yılmaz H. Psychache and Suicidal History in Patients with Obsessive-Compulsive Disorder. *Neuropsychiatr Dis Treat* 2019; **15**: 3531–9.

40 Demirkol ME, Tamam L, Namli Z, Karaytuğ MO, Uğur K. Association of Psychache and Alexithymia With Suicide in Patients With Schizophrenia. *J Nerv Ment Dis* 2019; **207**: 668–74.

41 Demirkol M, Tamam L, Namlı Z, Eris O. Validity and reliability study of the Turkish version of the tolerance for mental pain scale-10. 2019; **29**: 899–906.

42 Demirkol M, Uğur K, Tamam L. The mediating effects of psychache and dissociation in the relationship between childhood trauma and suicide attempts. *Anadolu Psikiyatri Dergisi* 2020; **21**: 453–60.

43 Ducasse D, Dassa D, Courtet P, *et al.* Gratitude diary for the management of suicidal inpatients: A randomized controlled trial. *Depress Anxiety* 2019; **36**: 400–11.

44 Ducasse D, Holden RR, Boyer L, *et al.* Psychological Pain in Suicidality: A Meta-Analysis. *J Clin Psychiatry* 2018; **79**: 16r10732.

45 Ducasse D, Jaussent I, Arpon-Brand V, *et al.* Acceptance and Commitment Therapy for the Management of Suicidal Patients: A Randomized Controlled Trial. *Psychother Psychosom* 2018; **87**: 211–22.

46 Ducasse D, René E, Béziat S, Guillaume S, Courtet P, Olié E. Acceptance and commitment therapy for management of suicidal patients: a pilot study. *Psychother Psychosom* 2014; **83**: 374–6.

47 Erbuto D, Innamorati M, Lamis DA, *et al.* Mediators in the Association Between Affective Temperaments and Suicide Risk Among Psychiatric Inpatients. *Psychiatry* 2018; **81**: 240–57.

48 Erinfolami AR, Olagunju AT, Oshodi YO, Akinbode AA, Fadipe B, Adeyemo WL. Psychological Distress and Emotional Pain Among Adult Attendees of a Dental Clinic: A Case-Control Study. *Ment Illn* 2016; **8**: 6006.

49 Fan L, Kong X, Zhang P, *et al.* Hypersensitivity to negative feedback during dynamic risky-decision making in major depressive disorder: An event-related potential study. *J Affect Disord* 2021; **295**: 1421–31.

50 Fava GA, Tomba E, Brakemeier E-L, *et al.* Mental Pain as a Transdiagnostic Patient-Reported Outcome Measure. *Psychother Psychosom* 2019; **88**: 341–9.

51 Fertuck EA, Karan E, Stanley B. The specificity of mental pain in borderline personality disorder compared to depressive disorders and healthy controls. *Borderline Personal Disord Emot Dysregul* 2016; **3**: 2.

52 Flamenbaum R, Holden R. Psychache as mediator in the relationship between perfectionism and suicidality. *Journal of Counseling Psychology* 2007; **54**: 51–61.

53 Frumkin MR, Robinaugh DJ, LeBlanc NJ, *et al.* The pain of grief: Exploring the concept of psychological pain and its relation to complicated grief, depression, and risk for suicide in bereaved adults. *J Clin Psychol* 2021; **77**: 254–67.

54 Grossman-Giron A, Becker G, Kivity Y, Shalev S, Tzur Bitan D. Mental pain intensity and tolerance as predictors of psychotherapy process and outcome. *J Clin Psychol* 2021; **77**: 1296–306.

55 Guidi J, Piolanti A, Gostoli S, Schamong I, Brakemeier E-L. Mental Pain and Euthymia as Transdiagnostic Clinimetric Indices in Primary Care. *Psychother Psychosom* 2019; **88**: 252–3.

56 Guimarães R, Fleming M, Cardoso MF. Validation of the Orbach & Mikulincer Mental Pain Scale (OMMP) on a drug addicted population. *Soc Psychiatry Psychiatr Epidemiol* 2014; **49**: 405–15.

57 Gvion Y, Apter A. Suicide and Suicidal Behavior. *Public Health Reviews* 2012; **34**. DOI:10.1007/BF03391677.

58 Gvion Y, Horesh N, Levi-Belz Y, Apter A. A proposed model of the development of suicidal ideations. *Compr Psychiatry* 2015; **56**: 93–102.

59 Gvion Y, Horresh N, Levi-Belz Y, *et al.* Aggression-impulsivity, mental pain, and communication difficulties in medically serious and medically non-serious suicide attempters. *Compr Psychiatry* 2014; **55**: 40–50.

60 Hall BB, Webb JR, Hirsch JK. Spirituality and suicidal behavior: The mediating role of self-forgiveness and psychache. *Psychology of Religion and Spirituality* 2020; **12**: 36–44.

61 Holden R, Campos R, Lambert C. Psychological pain and self-harming behaviours in an adulthood community sample: An exploratory study. *The European Journal of Psychiatry* 2020; **34**. DOI:10.1016/j.ejpsy.2020.03.001.

62 Holden RR, Campos RC, Simões A, Costa S, Pio AS, Lambert CE. The multidimensionality of suicide risk factors and criteria in a nonclinical population: Replication across two countries and two languages. *Int J Psychol* 2020; **55**: 926–35.

63 Holden RR, Lambert CE, La Rochelle M, Billet MI, Fekken GC. Invalidating childhood environments and nonsuicidal self-injury in university students: Depression and mental pain as potential mediators. *J Clin Psychol* 2021; **77**: 722–31.

64 Holden RR, Mehta K, Cunningham EJ, McLeod LD. Development and preliminary validation of a scale of psychache. *Canadian Journal of Behavioural Science / Revue canadienne des sciences du comportement* 2001; **33**: 224–32.

65 Horesh N, Levi Y, Apter A. Medically serious versus non-serious suicide attempts: relationships of lethality and intent to clinical and interpersonal characteristics. *J Affect Disord* 2012; **136**: 286–93.

66 Huen JMY, Zhang J, Osman A, Lew B, Yip PSF. Using Contemporary Psychometric Methods to Construct and Validate Scores on a Short-Form Version of the Psychological Strain Scales. *J Affect Disord* 2021; **281**: 1–8.

67 Ji X, Zhao J, Fan L, *et al.* Highlighting psychological pain avoidance and decision-making bias as key predictors of suicide attempt in major depressive disorder-A novel investigative approach using machine learning. *J Clin Psychol* 2022; **78**: 671–91.

68 Ji X, Zhao J, Li H, *et al.* From motivation, decision-making to action: An fMRI study on suicidal behavior in patients with major depressive disorder. *J Psychiatr Res* 2021; **139**: 14–24.

69 Jollant F, Near J, Turecki G, Richard-Devantoy S. Spectroscopy markers of suicidal risk and mental pain in depressed patients. *Prog Neuropsychopharmacol Biol Psychiatry* 2016; : S0278-5846(16)30167-1.

70 Jollant F, Olie E. La douleur psychologique. *Douleur et Analgésie* 2018; **31**: 122–8.

71 Jollant F, Perreira F, Fiori LM, *et al.* Neural and molecular correlates of psychological pain during major depression, and its link with suicidal ideas. *Prog Neuropsychopharmacol Biol Psychiatry* 2020; **100**: 109909.

72 Jollant F, Voegeli G, Kordsmeier NC, *et al.* A visual analog scale to measure psychological and physical pain: A preliminary validation of the PPP-VAS in two independent samples of depressed patients. *Prog Neuropsychopharmacol Biol Psychiatry* 2019; **90**: 55–61.

73 Klonsky ED, May A. The Three-Step Theory (3ST): A New Theory of Suicide Rooted in the " Ideation-to-Action " Framework. *International Journal of Cognitive Therapy* 2015; **8**: 114–29.

74 Kremer I, Orbach I, Rosenbloom T. Mental Pain and Suicidal Tendencies in Sexual and Physical Abuse Victims. *Arch Suicide Res* 2017; **21**: 307–21.

75 Lam B, Bond M, Chen S, Wu W. Worldviews and Individual Vulnerability to Suicide: The Role of Social Axioms. *European Journal of Personality* 2010; **24**: 602–22.

76 Lambert CE, Troister T, Ramadan Z, Montemarano V, Fekken GC, Holden RR. Psychache Predicts Suicide Attempter Status Change in Students Starting University. *Suicide Life Threat Behav* 2020; **50**: 668–78.

77 Landi G, Furlani A, Boccolini G, Mikulincer M, Grandi S, Tossani E. Tolerance for Mental Pain Scale (TMPS): Italian validation and evaluation of its protective role in depression and suicidal ideation. *Psychiatry Res* 2020; **291**: 113263.

78 Landi G, Grossman-Giron A, Bitan DT, Mikulincer M, Grandi S, Tossani E. Mental Pain, Psychological Distress, and Suicidal Ideation During the COVID-19 Emergency: the Moderating Role of Tolerance for Mental Pain. *Int J Ment Health Addict* 2021; : 1–12.

79 Lear MK, Stacy SE, Pepper CM. Interpersonal needs and psychological pain: The role of brooding and rejection sensitivity. *Death Stud* 2018; **42**: 521–8.

80 Leenaars A, Lester D. A Note on Shneidman's Psychological Pain Assessment Scale. *Omega-journal of Death and Dying - OMEGA-J DEATH DYING* 2005; **50**: 301–7.

81 Levi Y, Horesh N, Fischel T, Treves I, Or E, Apter A. Mental pain and its communication in medically serious suicide attempts: an 'impossible situation'. *J Affect Disord* 2008; **111**: 244–50.

82 Levi-Belz Y, Gvion Y, Grisaru S, Apter A. When the Pain Becomes Unbearable: Case-Control Study of Mental Pain Characteristics Among Medically Serious Suicide Attempters. *Arch Suicide Res* 2018; **22**: 380–93.

83 Levi-Belz Y, Gvion Y, Levi U, Apter A. Beyond the mental pain: A case-control study on the contribution of schizoid personality disorder symptoms to medically serious suicide attempts. *Compr Psychiatry* 2019; **90**: 102–9.

84 Levi-Belz Y, Gvion Y, Horesh N, *et al.* Mental pain, communication difficulties, and medically serious suicide attempts: a case-control study. *Arch Suicide Res* 2014; **18**: 74–87.

85 Levinger S, Holden R, Ben Dor D. Examining the Importance of Mental Pain and Physical Dissociation and the Fluid Nature of Suicidality in Young Suicide Attempters. *OMEGA - Journal of Death and Dying* 2016; **73**: 159–73.

86 Levinger S, Holden RR. Reliability and validation of the Hebrew Version of the Reasons for Attempting Suicide Questionnaire (RASQ-H) and its importance for mental pain. *Suicide Life Threat Behav* 2014; **44**: 486–96.

87 Lew B, Kõlves K, Osman A, *et al.* Suicidality among Chinese college students: A cross-sectional study across seven provinces. *PLoS One* 2020; **15**: e0237329.

88 Lew B, Kõlves K, Zhang J, *et al.* Religious affiliation and suicidality among college students in China: A cross-sectional study across six provinces. *PLoS One* 2021; **16**: e0251698.

89 Lew B, Osman A, Chan CMH, *et al.* Psychological characteristics of suicide attempters among undergraduate college students in China: a cross-sectional study. *BMC Public Health* 2021; **21**: 322.

90 Lewis KC, Good EW, Tillman JG, Hopwood CJ. Assessment of Psychological Pain in Clinical and Non-Clinical Samples: A Preliminary Investigation Using the Psychic Pain Scale. *Arch Suicide Res* 2020; : 1–18.

91 Li H, Fu R, Zou Y, Cui Y. Predictive Roles of Three-Dimensional Psychological Pain, Psychache, and Depression in Suicidal Ideation among Chinese College Students. *Front Psychol* 2017; **8**: 1550.

92 Li H, Xie W, Luo X, *et al.* Clarifying the role of psychological pain in the risks of suicidal ideation and suicidal acts among patients with major depressive episodes. *Suicide Life Threat Behav* 2014; **44**: 78–88.

93 Li X, You J, Ren Y, *et al.* A longitudinal study testing the role of psychache in the association between emotional abuse and suicidal ideation. *J Clin Psychol* 2019; **75**: 2284–92.

94 Martins M, Rc C, Is M. The mediating role of tolerance for psychological pain in the relationship of childhood trauma to suicidal ideation in individuals with a substance use disorder. *The British journal of clinical psychology* 2021; published online Oct 18. DOI:10.1111/bjc.12338.

95 Mee S, Bunney BG, Bunney WE, Hetrick W, Potkin SG, Reist C. Assessment of psychological pain in major depressive episodes. *J Psychiatr Res* 2011; **45**: 1504–10.

96 Mee S, Bunney BG, Fujimoto K, *et al.* A study of psychological pain in substance use disorder and its relationship to treatment outcome. *PLoS One* 2019; **14**: e0216266.

97 Meerwijk EL. We need to talk about psychological pain. *Issues Ment Health Nurs* 2012; **33**: 263–5.

98 Meerwijk EL, Chesla CA, Weiss SJ. Psychological pain and reduced resting-state heart rate variability in adults with a history of depression. *Psychophysiology* 2014; **51**: 247–56.

99 Meerwijk EL, Ford JM, Weiss SJ. Brain regions associated with psychological pain: implications for a neural network and its relationship to physical pain. *Brain Imaging Behav* 2013; **7**: 1–14.

100 Meerwijk EL, Ford JM, Weiss SJ. Suicidal crises because of diminishing tolerance to psychological pain. *Brain Imaging Behav* 2013; **7**: 245–7.

101 Meerwijk EL, Ford JM, Weiss SJ. Resting-state EEG delta power is associated with psychological pain in adults with a history of depression. *Biol Psychol* 2015; **105**: 106–14.

102 Meerwijk EL, Mikulincer M, Weiss SJ. Psychometric evaluation of the Tolerance for Mental Pain Scale in United States adults. *Psychiatry Res* 2019; **273**: 746–52.

103 Meerwijk EL, Weiss SJ. Utility of a time frame in assessing psychological pain and suicide ideation. *PeerJ* 2017; **5**: e3491.

104 Meerwijk EL, Weiss SJ. Tolerance for psychological pain and capability for suicide: Contributions to suicidal ideation and behavior. *Psychiatry Res* 2018; **262**: 203–8.

105 Mento C, Silvestri MC, Muscatello MRA, *et al.* Psychological pain and risk of suicide in adolescence. *Int J Adolesc Med Health* 2020; : /j/ijamh.ahead-of-print/ijamh-2019-0270/ijamh-2019-0270.xml.

106 Mills JF, Green K, Reddon JR. An evaluation of the Psychache Scale on an offender population. *Suicide Life Threat Behav* 2005; **35**: 570–80.

107 Montemarano V, Troister T, Lambert CE, Holden RR. A four-year longitudinal study examining psychache and suicide ideation in elevated-risk undergraduates: A test of Shneidman's model of suicidal behavior. *J Clin Psychol* 2018; **74**: 1820–32.

108 Muela A, Balluerka N, Sansinenea E, *et al.* A Social-Emotional Learning Program for Suicide Prevention through Animal-Assisted Intervention. *Animals (Basel)* 2021; **11**: 3375.

109 Nahaliel S, Sommerfeld E, Orbach I, Weller A, Apter A, Zalsman G. Mental pain as a mediator of suicidal tendency: a path analysis. *Compr Psychiatry* 2014; **55**: 944–51.

110 Ohana I, Golander H, Barak Y. Balancing psychache and resilience in aging Holocaust survivors. *Int Psychogeriatr* 2014; **26**: 929–34.

111 Olié E, Guillaume S, Jaussent I, Courtet P, Jollant F. Higher psychological pain during a major depressive episode may be a factor of vulnerability to suicidal ideation and act. *J Affect Disord* 2010; **120**: 226–30.

112 Olié E, Husky M, Bars EL, *et al.* Prefrontal activity during experimental ostracism and daily psychache in suicide attempters. *J Affect Disord* 2021; **285**: 63–8.

113 Orbach I, Mikulincer M, Gilboa-Schechtman E, Sirota P. Mental pain and its relationship to suicidality and life meaning. *Suicide Life Threat Behav* 2003; **33**: 231–41.

114 Orbach I, Mikulincer M, Sirota P, Gilboa-Schechtman E. Mental pain: a multidimensional operationalization and definition. *Suicide Life Threat Behav* 2003; **33**: 219–30.

115 Ordóñez-Carrasco JL, Cuadrado Guirado I, Rojas Tejada A. Scale of psychological pain: Spanish adaptation of the Psychache Scale in young adults. *Rev Psiquiatr Salud Ment (Engl Ed)* 2019; : S1888-9891(19)30051-5.

116 Ordóñez-Carrasco JL, Sánchez-Castelló M, Calandre EP, Cuadrado-Guirado I, Rojas-Tejada AJ. Suicidal Ideation Profiles in Patients with Fibromyalgia Using Transdiagnostic Psychological and Fibromyalgia-Associated Variables. *Int J Environ Res Public Health* 2020; **18**: E209.

117 Owoeye OA, Aina OF, Omoluabi PF, Olumide YM. An assessment of emotional pain among subjects with chronic dermatological problems in Lagos, Nigeria. *Int J Psychiatry Med* 2007; **37**: 129–38.

118 Pachkowski MC, Hewitt PL, Klonsky ED. Examining suicidal desire through the lens of the three-step theory: A cross-sectional and longitudinal investigation in a community sample. *J Consult Clin Psychol* 2021; **89**: 1–10.

119 Pachkowski MC, May AM, Tsai M, Klonsky ED. A Brief Measure of Unbearable Psychache. *Suicide Life Threat Behav* 2019; **49**: 1721–34.

120 Patterson AA, Holden RR. Psychache and suicide ideation among men who are homeless: a test of Shneidman's model. *Suicide Life Threat Behav* 2012; **42**: 147–56.

121 Pereira AM, Campos RC. Exposure to suicide in the family and suicidal ideation in Portugal during the Covid-19 pandemic: The mediating role of unbearable psychache. *Br J Clin Psychol* 2021; published online Aug 9. DOI:10.1111/bjc.12325.

122 Pereira EJ, Kroner DG, Holden RR, Flamenbaum R. Testing Shneidman's model of suicidality in incarcerated offenders and in undergraduates. *Personality and Individual Differences* 2010; **49**: 912–7.

123 Perez EM, Carrara H, Bourne L, Berg A, Swanevelder S, Hendricks MK. Massage therapy improves the development of HIV-exposed infants living in a low socio-economic, peri-urban community of South Africa. *Infant Behav Dev* 2015; **38**: 135–46.

124 Peterson AL, Bender AM, Sullivan B, Karver MS. Ambient Discrimination, Victimization, and Suicidality in a Non-Probability U.S. Sample of LGBTQ Adults. *Arch Sex Behav* 2021; **50**: 1003–14.

125 Pompili M, Lester D, Leenaars AA, Tatarelli R, Girardi P. Psychache and suicide: a preliminary investigation. *Suicide Life Threat Behav* 2008; **38**: 116–21.

126 Raz H, Tabak N. Mental Pain in Israeli Adult Childhood Cancer Survivors and Its Effects on their Quality of Life. *Journal of Psychology & Psychotherapy* 2016; **06**. DOI:10.4172/2161-0487.1000258.

127 Reist C, Mee S, Fujimoto K, Rajani V, Bunney WE, Bunney BG. Assessment of psychological pain in suicidal veterans. *PLoS One* 2017; **12**: e0177974.

128 Richard-Devantoy S, Ding Y, Lepage M, Turecki G, Jollant F. Cognitive inhibition in depression and suicidal behavior: a neuroimaging study. *Psychol Med* 2016; **46**: 933–44.

129 Richard-Devantoy S, Bertrand J-A, Béziat S, *et al.* Psychological pain and depression: it's hard to speak when it hurts. *Int J Psychiatry Clin Pract* 2021; **25**: 180–6.

130 Sanoeva M, Gulova M. Clinical validity and benefits of using botulinum toxin in the preventive treatment of refractory migraine headaches. *Toxicon* 2021; **190**: S67.

131 Shelef L, Fruchter E, Hassidim A, Zalsman G. Emotional regulation of mental pain as moderator of suicidal ideation in military settings. *Eur Psychiatry* 2015; **30**: 765–9.

132 Shneidman ES. The psychological pain assessment scale. *Suicide Life Threat Behav* 1999; **29**: 287–94.

133 Sioka C, Platari P, Papadopoulos A, *et al.* Quality of life and tolerance to mental pain scale in cancer patients subjected to bone scan. *J BUON* 2021; **26**: 620–5.

134 Song W, Li H, Guo T, Jiang S, Wang X. Effect of Affective Reward on Cognitive Event-related Potentials and its Relationship with Psychological Pain and Suicide Risk among Patients with Major Depressive Disorder. *Suicide Life Threat Behav* 2019; **49**: 1290–306.

135 Song W, Li H, Sun F, Guo T, Jiang S, Wang X. Pain Avoidance and Its Relation to Neural Response to Punishment Characterizes Suicide Attempters with Major Depression Disorder. *Psychiatry Res* 2020; **294**: 113507.

136 Soumani A, Damigos D, Oulis P, *et al.* Mental pain and suicide risk: application of the Greek version of the Mental Pain and the Tolerance of Mental Pain scale. *Psychiatriki* 2011; **22**: 330–40.

137 Spínola J, Campos RC, Marques D, Holden RR. Psychache, unmet interpersonal needs, childhood trauma and suicide ideation in young adults. *Death Stud* 2022; **46**: 930–9.

138 Sun X, Li H, Song W, Jiang S, Shen C, Wang X. ROC analysis of three-dimensional psychological pain in suicide ideation and suicide attempt among patients with major depressive disorder. *J Clin Psychol* 2020; **76**: 210–27.

139 Svicher A, Romanazzo S, De Cesaris F, Benemei S, Geppetti P, Cosci F. Mental Pain Questionnaire: An item response theory analysis. *J Affect Disord* 2019; **249**: 226–33.

140 Tanrıverdi D, Bekircan E, Koç Z. The Relationship Between Psychache and Suicide Risk With Spiritual Well-Being Levels of Patients Diagnosed With Depression. *J Am Psychiatr Nurses Assoc* 2022; : 10783903221079796.

141 Tillman JG, Clemence AJ, Cree R, Lewis KC, Stevens JL, Reiss D. The persistent shadow of suicide ideation and attempts in a high-risk group of psychiatric patients: A focus for intervention. *Compr Psychiatry* 2017; **77**: 20–6.

142 Tomba E, Tecuta L, Gardini V, Lo Dato E. Mental Pain in Eating Disorders: An Exploratory Controlled Study. *J Clin Med* 2021; **10**: 3584.

143 Tossani E. The concept of mental pain. *Psychother Psychosom* 2013; **82**: 67–73.

144 Tossani E, Garotti M, Mikulincer M, *et al.* Psychometric evaluation of the Italian version of Orbach & Mikulincer mental pain scale in a non-clinical sample. *Current Psychology* 2021; **40**. DOI:10.1007/s12144-019-0128-4.

145 Trakhtenbrot R, Gvion Y, Levi-Belz Y, *et al.* Predictive value of psychological characteristics and suicide history on medical lethality of suicide attempts: A follow-up study of hospitalized patients. *J Affect Disord* 2016; **199**: 73–80.

146 Trent Haines R, Jackson AD, Thomas EL. Evaluating the Orbach Mikulincer Mental Pain Scale among Late Adolescent and Early Adult African Americans: A Rasch Analysis. *Issues Ment Health Nurs* 2015; **36**: 761–72.

147 Tripp DA, Dueck J, Holden RR, Moreau J, Doiron RC, Nickel JC. Biopsychosocial predictors of suicide risk in patients with interstitial cystitis/bladder pain syndrome. *Can Urol Assoc J* 2021; **15**: E630–6.

148 Troister T, D'Agata MT, Holden RR. Suicide risk screening: Comparing the Beck Depression Inventory-II, Beck Hopelessness Scale, and Psychache Scale in undergraduates. *Psychol Assess* 2015; **27**: 1500–6.

149 Troister T, Davis MP, Lowndes A, Holden RR. A five-month longitudinal study of psychache and suicide ideation: replication in general and high-risk university students. *Suicide Life Threat Behav* 2013; **43**: 611–20.

150 Troister T, Holden R. Comparing psychache, depression, and hopelessness in their associations with suicidality: A test of Shneidman's theory of suicide. *Personality and Individual Differences* 2010; **49**: 689–93.

151 Troister T, Holden RR. A two-year prospective study of psychache and its relationship to suicidality among high-risk undergraduates. *J Clin Psychol* 2012; **68**: 1019–27.

152 Troister T, Holden RR. Factorial differentiation among depression, hopelessness, and psychache in statistically predicting suicidality. *Measurement and Evaluation in Counseling and Development* 2013; **46**: 50–63.

153 Uğur K, Demirkol ME, Tamam L. The Mediating Roles of Psychological Pain and Dream Anxiety in the Relationship between Sleep Disturbance and Suicide. *Arch Suicide Res* 2020; : 1–17.

154 Uğur K, Polat H. The relationship of suicidal ideation with psychological pain and anger rumination in patients with major depressive disorder. *Arch Psychiatr Nurs* 2021; **35**: 479–85.

155 van Heeringen K, Van den Abbeele D, Vervaet M, Soenen L, Audenaert K. The functional neuroanatomy of mental pain in depression. *Psychiatry Res* 2010; **181**: 141–4.

156 Vandevoorde J, Sanchez Valero A, Baudoin E, Kamar S, Chabert B, Baudoin T. Measurement of flow of thought in 68 patients monitored in post-emergency outpatient consultations: Role of ideational turmoil in the anxiety depressive symptomatology. *Encephale* 2018; **44**: 308–14.

157 Verrocchio MC, Carrozzino D, Marchetti D, Andreasson K, Fulcheri M, Bech P. Mental Pain and Suicide: A Systematic Review of the Literature. *Front Psychiatry* 2016; **7**: 108.

158 Wolford-Clevenger C, Flores LY, Stuart GL. Proximal correlates of suicidal ideation among transgender and gender diverse people: A preliminary test of the three-step theory. *Suicide Life Threat Behav* 2021; **51**: 1077–85.

159 Xie W, Li H, Luo X, *et al.* Anhedonia and pain avoidance in the suicidal mind: behavioral evidence for motivational manifestations of suicidal ideation in patients with major depressive disorder. *J Clin Psychol* 2014; **70**: 681–92.

160 Yager J. Addressing Patients' Psychic Pain. *Am J Psychiatry* 2015; **172**: 939–43.

161 Yang L, Liu X, Chen W, Li L. A Test of the Three-Step Theory of Suicide among Chinese People: A Study Based on the Ideation-to-Action Framework. *Arch Suicide Res* 2019; **23**: 648–61.

162 Yang X, Liu D, Wang Y, *et al.* Effectiveness of Zhong-Yong thinking based dialectical behavior therapy group skills training versus supportive group therapy for lowering suicidal risks in Chinese young adults: A randomized controlled trial with a 6-month follow-up. *Brain Behav* 2020; **10**: e01621.

163 Yang Y, Wang S, Hu B, *et al.* Do Older Adults with Parent(s) Alive Experience Higher Psychological Pain and Suicidal Ideation? A Cross-Sectional Study in China. *Int J Environ Res Public Health* 2020; **17**: E6399.

164 You Z, Song J, Wu C, Qin P, Zhou Z. Effects of life satisfaction and psychache on risk for suicidal behaviour: a cross-sectional study based on data from Chinese undergraduates. *BMJ Open* 2014; **4**: e004096.

165 Zartaloudi A. Suicide in elderly people. *International Psychogeriatrics* 2021; **33**: 75–75.

166 Zhou X, Li X, Wang Z. Impact of individualized intervention on the psychological status of patients with localized small cell lung cancer complicated with pleural effusion. *Psychol Health Med* 2021; : 1–8.

167 Zou Y, Li H, Shi C, Lin Y, Zhou H, Zhang J. Efficacy of psychological pain theory-based cognitive therapy in suicidal patients with major depressive disorder: A pilot study. *Psychiatry Res* 2017; **249**: 23–9.

Supplementary material 4 – Data charting form for the systematic review

We extracted:

- name of the measure,
- characteristics of the study (eg, journal, year of publication, author, title, country, language).
- field of study
    - clinical psychology: studying human experience and behaviour
    - experimental psychology: involving an experimental design
    - social psychology: focusing on social interaction
    - psychometrics: focusing on the measurement properties of an instrument
    - biomarker study: studying the correlation with a physiological parameter
    - effectiveness research: testing or involving a therapeutic method
- study design
    - reviews
    - observational studies
    - interventional studies
    - development and validation studies of mental pain measurement instrument
- population
    - sample size
    - type:
        - general population
        - patients
            - type of disorder:
                - mood disorder
                - schizophrenia
                - anxiety disorder,
                - addiction
                - abuse/trauma
                - personality disorder
- Whether or not mental pain was the main outcome
- If the studies investigated suicidal behaviours, so as to evaluate the use of mental pain measures for their original purpose (suicidology) and for other purposes.

Supplementary material 5a – COSMIN box 1. Standards for evaluating the quality of PROM development

COSMIN box 1. Standards for evaluating the quality of PROM development

Check the COSMIN website to see if the quality of the PROM development was already rated in another review

Ratings: V= very good; A = adequate; D = doubtful; I = inadequate; N= not applicable

1a. PROM design

	General design requirements
1	Is a clear description provided of the construct to be measured?
2	Is the origin of the construct clear: was a theory, conceptual framework or disease model used or clear rationale provided to define the construct to be measured?
3	Is a clear description provided of the target population for which the PROM was developed?
4	Is a clear description provided of the context of use (i.e. discriminative, evaluative purpose, and/or predictive)
5	Was the PROM development study performed in a sample representing the target population for which the PROM was developed?

	Concept elicitation (relevance and comprehensiveness)
6	Was an appropriate qualitative data collection method used to identify relevant items for a new PROM?
7	Were skilled group moderators/interviewers used?
8	Were the group meetings or interviews based on an appropriate topic or interview guide?
9	Were the group meetings or interviews recorded and transcribed verbatim?
10	Was an appropriate approach used to analyse the data?
11	Was at least part of the data coded independently?
12	Was data collection continued until saturation was reached?
13	For quantitative studies: was the sample size appropriate?
	SUBTOTAL QUALITY CONCEPT ELICITATION STUDY *Lowest score of items 6-13*

	TOTAL QUALITY OF THE PROM DESIGN *Lowest score of items 1-13*

1b. Cognitive interview study or other pilot test

14	Was a cognitive interview study or other pilot test performed? *If NO skip items 15-35*

	General design requirements
15	Was the cognitive interview study or other pilot test performed in a sample representing the target population?

	Comprehensibility
16	Were patients asked about the comprehensibility of the PROM? *If NO or not clear, skip items 17-25*
17	Were all items tested in their final form?
18	Was an appropriate qualitative method used to assess the comprehensibility of the PROM instructions, items, response options, and recall period?
19	Was each item tested in an appropriate number of patients?

20	Were skilled interviewers used?
21	Were the interviews based on an appropriate interview guide?
22	Were the interviews recorded and transcribed verbatim?
23	Was an appropriate approach used to analyse the data?
24	Were at least two researchers involved in the analysis?
25	Were problems regarding the comprehensibility of the PROM instructions, items, response options, and recall period appropriately addressed by adapting the PROM?
	SUBTOTAL QUALITY OF COMPREHENSIBILITY STUDY *Lowest score of items 15-25*

	Comprehensiveness
26	Were patients asked about the comprehensiveness of the PROM? *If NO or not clear, skip items 27-35*
27	Was the final set of items tested?
28	Was an appropriate method used for assessing the comprehensiveness of the PROM?
29	Was each item tested in an appropriate number of patients?
30	Were skilled interviewers used?
31	Were the interviews based on an appropriate interview guide?
32	Were the interviews recorded and transcribed verbatim?
33	Was an appropriate approach used to analyse the data?
34	Were at least two researchers involved in the analysis?
35	Were problems regarding the comprehensiveness of the PROM appropriately addressed by adapting the PROM?
	SUBTOTAL QUALITY OF COMPREHENSIVENESS STUDY *Lowest score of items 15, 26-35*

	TOTAL QUALITY OF THE PILOT STUDY *Lowest score of items 14-35*

	TOTAL QUALITY OF THE PROM DEVELOPMENT STUDY *Lowest score of items 1-35*

Explanation from the COSMIN methodology for assessing the content validity of PROMS, User manual, version 1.0, p14-15:

A 4-point rating scale is used (i.e. very good, adequate, doubtful, inadequate) to rate each standard. Standards that are considered not applicable can be skipped. An Excel file is provided on the COSMIN website for data entry and calculating overall ratings.

When rating the standards, the following general rules should be applied:
- A standard is rated as very good when there is evidence that the quality aspect of the study to which the standard is referring is adequate. For example, if evidence is provided that interviews were based on an appropriate interview guide (e.g. the guide was clearly described or published) standard 8 in box 1 is rated as very good.
- A standard is rated as adequate when relevant information is not reported in an article, but it can be assumed that the quality aspect is adequate. For example, if it is assumable that saturation was reached (e.g. because a large number of focus groups or interviews were performed in a diverse sample of patients), but evidence is not provided, standard 12 in box 1 is rated as adequate.

- A standard is rated as doubtful if it is doubtful whether the quality aspect is adequate. For example, if it was doubtful whether the cognitive interview study was performed in a diverse sample of patients (e.g. because the characteristics of the patient sample were not clearly described), standard 15 of box 1 is rated as doubtful.
- Finally, a standard is rated as inadequate when evidence is provided that the quality aspect is not adequate. For example, if items were not re-tested after substantial adjustments standard 25 of box 1 is rated as inadequate.

An overall rating for the PROM development can be obtained by taking the lowest rating of any of the standards in box 1 ("worst score counts" method). It is also possible to obtain and report a rating for a specific part of the box, e.g. for the concept elicitation study (items 6-13), the total PROM design (items 1- 13), the cognitive interview study (items 15-35).

The "worst score counts" method is used in all COSMIN boxes because poor methodological aspects of a study cannot be compensated by good aspects. In defining the response options, the ''worst score counts'' method was taken into consideration. Only fatal flaws in the design or statistical analyses were regarded as inadequate quality. If, for example, an appropriate qualitative data collection method was not used to identify relevant items for a new PROM, this is considered a fatal flaw in the PROM development study and the overall quality of the PROM development study is rated as inadequate. For some standards, the worst possible response option was defined as adequate or doubtful instead of inadequate because we did not want these standards to have too much impact on the quality rating per box.

Supplementary material 5b – COSMIN box 2. Standards for evaluating the quality of content validity studies of PROMs

COSMIN box 2. Standards for evaluating the quality of content validity studies of PROMs

Only those parts of the box need to be completed for which information is available

Score: V= very good; A = adequate; D = doubtful; I = inadequate; N= not applicable

2a. Asking patient about relevance	
1	Was an appropriate method used to ask patients whether each item is relevant for their experience with the condition?
2	Was each item tested in an appropriate number of patients?
3	Were skilled group moderators/interviewers used?
4	Were the group meetings or interviews based on an appropriate topic or interview guide?
5	Were the group meetings or interviews recorded and transcribed verbatim?
6	Was an appropriate approach used to analyse the data?
7	Were at least two researchers involved in the analysis?
	SUBTOTAL QUALITY OF RELEVANCE STUDY *Lowest score of items 1-7*

2b. Asking patients about comprehensiveness	
8	Was an appropriate method used for assessing the comprehensiveness of the PROM?
9	Was each item tested in an appropriate number of patients?
10	Were skilled group moderators/interviewers used?
11	Were the group meetings or interviews based on an appropriate topic or interview guide?
12	Were the group meetings or interviews recorded and transcribed verbatim?
13	Was an appropriate approach used to analyse the data?
14	Were at least two researchers involved in the analysis?
	SUBTOTAL QUALITY OF COMPREHENSIVENESS STUDY *Lowest score of items 8-14*

2c. Asking patients about comprehensibility	
15	Was an appropriate qualitative method used for assessing the comprehensibility of the PROM instructions, items, response options, and recall period?
16	Was each item tested in an appropriate number of patients?
17	Were skilled group moderators/interviewers used?
18	Were the group meetings or interviews based on an appropriate topic or interview guide?
19	Were the group meetings or interviews recorded and transcribed verbatim?
20	Was an appropriate approach used to analyse the data?
21	Were at least two researchers involved in the analysis?
	SUBTOTAL QUALITY OF COMPREHENSIBILITY STUDY *Lowest score of items 15-21*

2d. Asking professionals about relevance	
22	Was an appropriate method used to ask professionals whether each item is relevant for the construct of interest?
23	Were professionals from all relevant disciplines included?
24	Was each item tested in an appropriate number of professionals?
25	Was an appropriate approach used to analyse the data?
26	Were at least two researchers involved in the analysis?
	SUBTOTAL QUALITY OF RELEVANCE STUDY *Lowest score of items 22-26*

2e. Asking professionals about comprehensiveness	
27	Was an appropriate method used for assessing the comprehensiveness of the PROM?
28	Were professionals from all relevant disciplines included?
29	Was each item tested in an appropriate number of professionals?
30	Was an appropriate approach used to analyse the data?
31	Were at least two researchers involved in the analysis?
	SUBTOTAL QUALITY OF COMPREHENSIVENESS STUDY *Lowest score of items 27-31*

Explanation from the COSMIN methodology for assessing the content validity of PROMS, User manual, version 1.0 :

Page 14-15: A 4-point rating scale is used (i.e. very good, adequate, doubtful, inadequate) to rate each standard. Standards that are considered not applicable can be skipped. An Excel file is provided on the COSMIN website for data entry and calculating overall ratings.

When rating the standards, the following general rules should be applied:
- A standard is rated as very good when there is evidence that the quality aspect of the study to which the standard is referring is adequate.
- A standard is rated as adequate when relevant information is not reported in an article, but it can be assumed that the quality aspect is adequate.
- A standard is rated as doubtful if it is doubtful whether the quality aspect is adequate.
- Finally, a standard is rated as inadequate when evidence is provided that the quality aspect is not adequate.

An overall rating for the content validity study can be obtained by taking the lowest rating of any of the standards in box 2. However, often only one or a few parts of box 2 will be completed. In that case we recommend to determine the overall ratings per sub study separately (part 2a, 2b, 2c, 2d, 2e).

The "worst score counts" method is used in all COSMIN boxes because poor methodological aspects of a study cannot be compensated by good aspects. In defining the response options, the ''worst score counts'' method was taken into consideration. Only fatal flaws in the design or statistical analyses were regarded as inadequate quality. If, for example, an appropriate qualitative data collection method was not used to identify relevant items for a new PROM, this is considered a fatal flaw in the PROM development study and the overall quality of the PROM development study is rated as inadequate. For some standards, the worst possible response option was defined as adequate or doubtful instead of inadequate because we did not want these standards to have too much impact on the quality rating per box.

Page 36: "**If patients nor professionals were asked about the relevance, comprehensiveness, or comprehensibility of the PROM items, no parts of the box can be completed and the results of the study will be ignored.**
Example: Content validity of the WHO-QOL-BREF was examined in a study by calculating the skewness and kurtosis of each item. One question was excluded from further analyses because of values deviating too much from prevailing skewness or kurtosis criteria. It was concluded that the content validity of the remaining items was good [74]. Since the study did not ask patients, not professionals about the relevance, comprehensiveness, or comprehensibility of the PROM items, this is not regarded as a content validity study, and the results of the study are ignored."

Supplementary material 6 – Development and validation studies for the measures of mental pain

Development and validation studies for the PPAS

1 Leenaars A, Lester D. A Note on Shneidman's Psychological Pain Assessment Scale. *Omega-journal of Death and Dying - OMEGA-J DEATH DYING* 2005; **50**: 301–7.

2 Pompili M, Lester D, Leenaars AA, Tatarelli R, Girardi P. Psychache and suicide: a preliminary investigation. *Suicide Life Threat Behav* 2008; **38**: 116–21.

3 Shneidman ES. The Psychological Pain Assessment Scale. *Suicide and Life-Threatening Behavior* 1999; **29**: 287–94.

Development and validation studies for the PAS

1 Campos RC, Holden RR. Psychological pain and previous suicide attempts in young adults: Results with the Portuguese version of the Psychache Scale. *J Clin Psychol* 2020; **76**: 1965–71.

2 Campos RC, Holden RR, Gomes M. Assessing psychache as a suicide risk variable: Data with the Portuguese version of the psychache scale. *Death Stud* 2019; **43**: 527–33.

3 Chodkiewicz J, Miniszewska J, Strzelczyk D, Gąsior K. Polish Adaptation of the Psychache Scale by Ronald Holden and Co-workers. *Psychiatr Pol* 2017; **51**: 369–81.

4 DeLisle M, Holden R. Differentiating Between Depression, Hopelessness, and Psychache in University Undergraduates. *Measurement and Evaluation in Counseling and Development* - 2009; **42**: 46–63.

5 Holden RR, Mehta K, Cunningham EJ, McLeod LD. Development and preliminary validation of a scale of psychache. *Canadian Journal of Behavioural Science / Revue canadienne des sciences du comportement* 2001; **33**: 224–32.

6 Meerwijk EL, Weiss SJ. Utility of a time frame in assessing psychological pain and suicide ideation. *PeerJ* 2017; **5**: e3491.

7 Mills JF, Green K, Reddon JR. An evaluation of the Psychache Scale on an offender population. *Suicide Life Threat Behav* 2005; **35**: 570–80.

8 Ordóñez-Carrasco JL, Cuadrado Guirado I, Rojas Tejada A. Scale of psychological pain: Spanish adaptation of the Psychache Scale in young adults. *Rev Psiquiatr Salud Ment (Engl Ed)* 2019; : S1888-9891(19)30051-5.

9 Patterson AA, Holden RR. Psychache and suicide ideation among men who are homeless: a test of Shneidman's model. *Suicide Life Threat Behav* 2012; **42**: 147–56.

10 Troister T, D'Agata MT, Holden RR. Suicide risk screening: Comparing the Beck Depression Inventory-II, Beck Hopelessness Scale, and Psychache Scale in undergraduates. *Psychol Assess* 2015; **27**: 1500–6.

Development and validation studies for the OMMPS-44

1 Guimarães R, Fleming M, Cardoso MF. Validation of the Orbach & Mikulincer Mental Pain Scale (OMMP) on a drug addicted population. *Soc Psychiatry Psychiatr Epidemiol* 2014; **49**: 405–15.

2 Orbach I, Mikulincer M, Sirota P, Gilboa-Schechtman E. Mental pain: a multidimensional operationalization and definition. *Suicide Life Threat Behav* 2003; **33**: 219–30.

3Trent Haines R, Jackson AD, Thomas EL. Evaluating the Orbach Mikulincer Mental Pain Scale among Late Adolescent and Early Adult African Americans: A Rasch Analysis. *Issues Ment Health Nurs* 2015; **36**: 761–72.

Development and validation studies for the OMMPS-40 items

1 Meerwijk EL, Chesla CA, Weiss SJ. Psychological pain and reduced resting-state heart rate variability in adults with a history of depression. *Psychophysiology* 2014; **51**: 247–56.

2 Orbach I. Personnal Communication. 2010; published online Feb 17.

Of note, Levinger et al. 2015 used a 41 items version.

Development and validation studies for the OMMPS-31 items

1Tossani E, Garotti M, Mikulincer M, et al. Psychometric evaluation of the Italian version of Orbach & Mikulincer mental pain scale in a non-clinical sample. Current Psychology 2021; 40. DOI:10.1007/s12144-019-0128-4.

Development and validation studies for the OMMPS-8 items

1 Casanova MP, Nelson MC, Pickering MA, *et al.* Measuring psychological pain: psychometric analysis of the Orbach and Mikulincer Mental Pain Scale. *Measurement Instruments for the Social Sciences* 2021; **3**: 7.

Development and validation studies for the TMPS-20

1 Becker G, Orbach I, Mikulincer M, Iohan M, Gilboa-Schechtman E, Grossman-Giron A. Reexamining the Mental Pain-Suicidality Link in Adolescence: The Role of Tolerance for Mental Pain. *Suicide Life Threat Behav* 2019; **49**: 1072–84.

2 Soumani A, Damigos D, Oulis P, *et al.* Mental pain and suicide risk: application of the Greek version of the Mental Pain and the Tolerance of Mental Pain scale. *Psychiatriki* 2011; **22**: 330–40.

3Orbach I, Gilboa-Schechtman E, Johan M, Mikulincer M, 2004. Tolerance for Mental Pain Scale. Bar-Ilan University, Ramat-Gan, Israel (unpublished data, no access available when contacting the author)

Development and validation studies for the TMPS-10

1 Demirkol M, Tamam L, Namlı Z, Eris O. Validity and reliability study of the Turkish version of the tolerance for mental pain scale-10. 2019; **29**: 899–906.

2 Landi G, Furlani A, Boccolini G, Mikulincer M, Grandi S, Tossani E. Tolerance for Mental Pain Scale (TMPS): Italian validation and evaluation of its protective role in depression and suicidal ideation. *Psychiatry Res* 2020; **291**: 113263.

3Meerwijk EL, Mikulincer M, Weiss SJ. Psychometric evaluation of the Tolerance for Mental Pain Scale in United States adults. *Psychiatry Res* 2019; **273**: 746–52.

Development and validation studies for the PPP-VAS

1 Jollant F, Voegeli G, Kordsmeier NC, *et al.* A visual analog scale to measure psychological and physical pain: A preliminary validation of the PPP-VAS in two independent samples of depressed patients. *Prog Neuropsychopharmacol Biol Psychiatry* 2019; **90**: 55–61.

2 Olié E, Guillaume S, Jaussent I, Courtet P, Jollant F. Higher psychological pain during a major depressive episode may be a factor of vulnerability to suicidal ideation and act. *J Affect Disord* 2010; **120**: 226–30.

Development and validation studies for the MBPPS

1 Mee S, Bunney BG, Bunney WE, Hetrick W, Potkin SG, Reist C. Assessment of psychological pain in major depressive episodes. *J Psychiatr Res* 2011; **45**: 1504–10.

2 Mee S, Bunney BG, Fujimoto K, *et al.* A study of psychological pain in substance use disorder and its relationship to treatment outcome. *PLoS One* 2019; **14**: e0216266.

3 Reist C, Mee S, Fujimoto K, Rajani V, Bunney WE, Bunney BG. Assessment of psychological pain in suicidal veterans. *PLoS One* 2017; **12**: e0177974.

Development and validation studies for the TDPPS

1 Campos RC, Simões A, Costa S, Pio AS, Holden RR. Psychological pain and suicidal ideation in undergraduates: The role of pain avoidance. *Death Stud* 2020; **44**: 375–8.

2 Li H, Fu R, Zou Y, Cui Y. Predictive Roles of Three-Dimensional Psychological Pain, Psychache, and Depression in Suicidal Ideation among Chinese College Students. *Front Psychol* 2017; **8**: 1550.

3 Li H, Xie W, Luo X, *et al.* Clarifying the role of psychological pain in the risks of suicidal ideation and suicidal acts among patients with major depressive episodes. *Suicide Life Threat Behav* 2014; **44**: 78–88.

4 Sun X, Li H, Song W, Jiang S, Shen C, Wang X. ROC analysis of three-dimensional psychological pain in suicide ideation and suicide attempt among patients with major depressive disorder. *J Clin Psychol* 2020; **76**: 210–27.

Development and validation studies for the MPQ

1 Fava GA. Well-Being Therapy: Current Indications and Emerging Perspectives. *Psychother Psychosom* 2016; **85**: 136–45.

2 Fava GA, Tomba E, Brakemeier E-L, *et al.* Mental Pain as a Transdiagnostic Patient-Reported Outcome Measure. *Psychother Psychosom* 2019; **88**: 341–9.

3 Fava, G. Well-Being Therapy. La psychothérapie du bien-être | Livre | 9782294760501, Elsevier Masson. 2018

4 Guidi J, Piolanti A, Gostoli S, Schamong I, Brakemeier E-L. Mental Pain and Euthymia as Transdiagnostic Clinimetric Indices in Primary Care. *Psychother Psychosom* 2019; **88**: 252–3.

5 Svicher A, Romanazzo S, De Cesaris F, Benemei S, Geppetti P, Cosci F. Mental Pain Questionnaire: An item response theory analysis. *J Affect Disord* 2019; **249**: 226–33.

Development and validation studies for the UP3

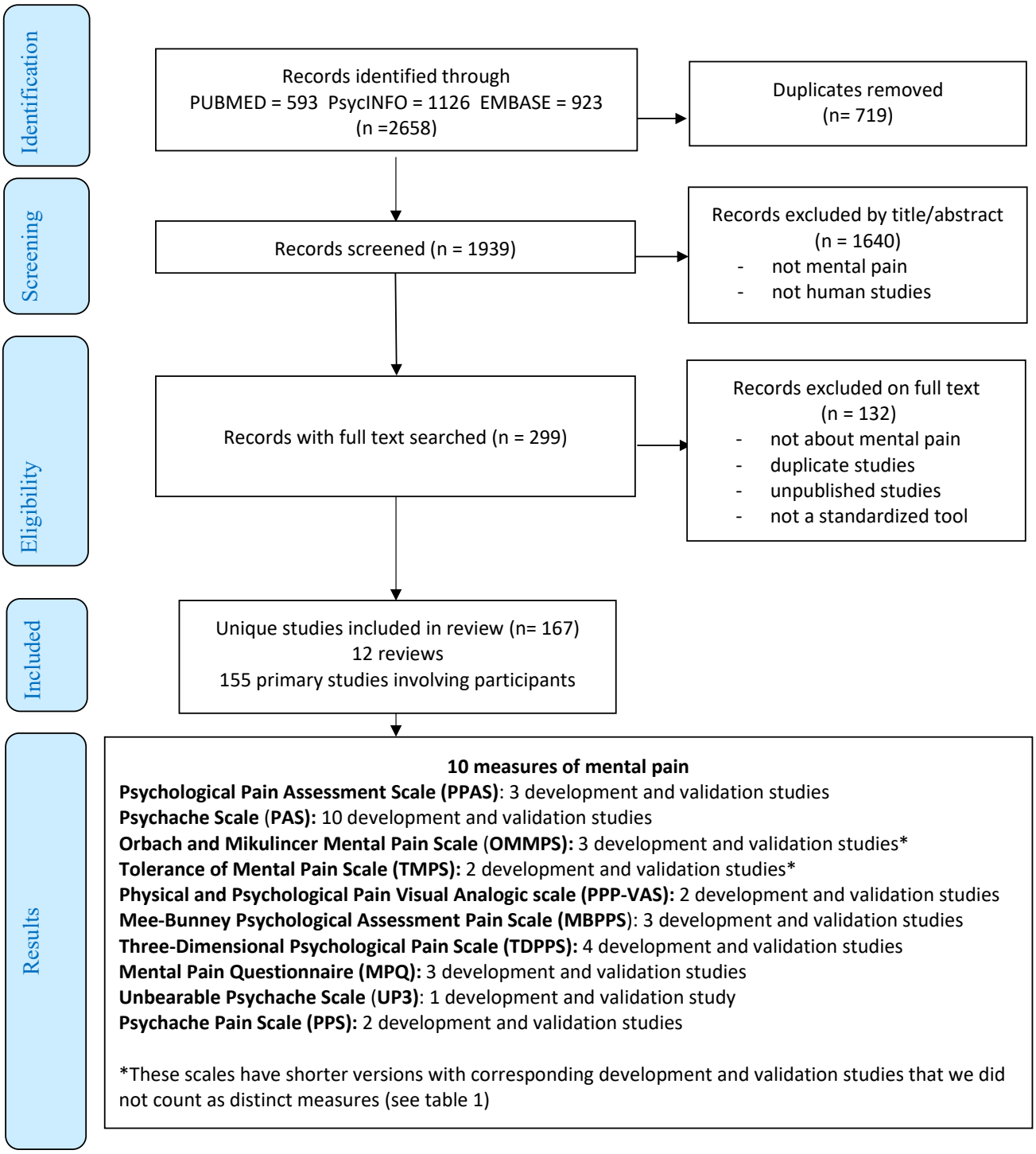
1 Pachkowski MC, May AM, Tsai M, Klonsky ED. A Brief Measure of Unbearable Psychache. *Suicide Life Threat Behav* 2019; **49**: 1721–34.

Development and validation studies for the PPS

1 Lewis KC, Good EW, Tillman JG, Hopwood CJ. Assessment of Psychological Pain in Clinical and Non-Clinical Samples: A Preliminary Investigation Using the Psychic Pain Scale. *Arch Suicide Res* 2020; : 1–18.

2 Tillman JG, Clemence AJ, Cree R, Lewis KC, Stevens JL, Reiss D. The persistent shadow of suicide ideation and attempts in a high-risk group of psychiatric patients: A focus for intervention. *Compr Psychiatry* 2017; **77**: 20–6.

Supplementary material 7 – Flow chart of systematic review to identify measures of mental



Supplementary material 8 - Description of the studies included in the review

Field and type of studies. All studies: N=167

Field	**Number of studies N=107**	
Clinical psychology	105	
Psychometric	37	
Biomarker studies	12	
Effectiveness research	10	
Experimental psychology	4	
Social psychology	2	
Type of study		
Observational	107	
Development and validation	38	
Review	12	
Interventional	10	

Type of Reviews and objective/main outcome. N=12

Type of review	**Number of reviews N=12**	**Objective or main outcome**
Systematic review	2	*Mental pain and suicide: A systematic review of the literature, Verrocchio et al., 2016* **Objective:** to investigate the relationship of mental pain and suicide *Psychological pain and risk of suicide in adolescence*, Mento et al., 2020 **Objective:** to investigate the relationship of mental pain and suicide
Meta-analysis	1	*Psychological pain in suicidality: A meta-analysis, Ducasse et al., 2018* **Main outcome**: Difference in psychological pain between individuals with and without current or lifetime history of suicidal ideation or suicide attempt.
Narrative review	9	**Objectives:** - To investigate the relationship between mental pain and suicide (N=4) - To synthesise knowledge about mental pain (N=4) - To synthesise knowledge about neural network and mental pain (N=1)

Characteristics of primary studies involving participants. N=153

Country		
North America	49	
Europe	44	
Middle-East	26	
Asia	22	
Africa	4	
Multiple countries	8	
Population		
Clinical population	71	
General population	58	
Both	24	
Studies including clinical populations with mental disorders *N=75		
Mood disorders	51	
Schizophrenia	12	
Anxiety disorders	13	
Addiction	7	
Trauma	4	
Personality disorders	7	
NA	18	
Sample size		
<100	44	
100-500	73	
500-1000	18	
>1000	18	
Studies investigating the relationship between suicidal ideation and behaviour	97	
Studies investigating mental pain as a primary aim	116	

*** 153 studies involving participants = 167 studies -12 review -2 development/validation study without participants**

Countries detail

Countries	
USA	30
Chine	21
Canada	19
Israel	19
Italy	12
France	11
Portugal	10
Multiple countries	9
Turkey	8
Poland	4
Spain	3
Nigeria	2
Greece	2
Belgium	1
Uzbekistan	1
South Africa	1

Supplementary material 9 – Comparison of the content validity of the mental pain measures

PROM	Content validity				
	Asking patients			Asking professionals	
	Relevance	Comprehensiveness	Comprehensibility	Relevance	Comprehensiveness
PPAS	I	I	I	I	I
PAS	I	I	I	I	I
OMMPS	I	I	I	I	I
TMPS	I	I	I	I	I
PPP-VAS	I	I	I	I	I
MBPPS	D	D	D	I	I
TDPPS	I	I	I	I	I
MPQ	I	I	I	I	I
UP3	I	I	I	I	I
PPS	I	I	I	I	I

This table is proposed as in the *COSMIN methodology for assessing the content validity of PROMs, user manual version 1.0 https://www.cosmin.nl/wp-content/uploads/PROM-Development-ratings-for-COSMIN-website-v1.pdf*
V = very good; A = adequate; D = doubtful; I = inadequate; NA = not applicable

Psychological Pain Assessment scale (PPAS), the Psychache Scale (PAS), and the Unbearable Psychache Scale, consisting in three items from the PAS, the Orbach and Mikulincer Mental Pain Scale (OMMPS 44 items), the Psychache Pain Scale (PPS 12 items), the Physical and Psychological Pain Visual Analogue Scale (PPPVAS), the Mee-Bunney Psychological Assessment Pain Scale (MBPPS), the Three-Dimensional Psychological Pain Scale (TDPPS), the Mental Pain Questionnaire (MPQ), the Tolerance of Mental Pain Scale (TMPS 20 items)

To rate each item of the COSMIN checklist, we used for each measures the selection of papers gathered in **Supplementary material 6.**

For the PPAS, the PAS, the UP3, the OMMPS, the PPS, the PPP-VAS, the MBPPS, TDPPS, and the TMPS we found no report of an evaluation of the content validity. Therefore, as recommended by COSMIN, we quoted "Inadequate"*[1].

For the MBPPS, we found one citation about the content validity in Mee-Bunney 2011 (paragraph 2.3: "*Known-groups, content and convergent validity and internal reliability of the scale were established through administration of the scale to MDE subjects and to a comparison group of normal controls*.") Following the COSMIN guidelines, we quoted the cognitive interview as 'Doubtful' since the method was not clearly reported.

[1] "**If patients nor professionals were asked about the relevance, comprehensiveness, or comprehensibility of the PROM items, no parts of the box can be completed and the results of the study will be ignored.**
Example: Content validity of the WHO-QOL-BREF was examined in a study by calculating the skewness and kurtosis of each item. One question was excluded from further analyses because of values deviating too much from prevailing skewness or kurtosis criteria. It was concluded that the content validity of the remaining items was good [74]. Since the study did not ask patients, not professionals about the relevance, comprehensiveness, or comprehensibility of the PROM items, this is not regarded as a content validity study, and the results of the study are ignored."
Page 36 of COSMIN methodology for assessing the content validity of PROMs, user manual, version 1.0. https://cosmin.nl/wp-content/uploads/COSMIN-methodology-for-content-validity-user-manual-v1.pdf

For further explanation of the methodology of the evaluation (how to rate each of the 31 items of the checklist), please see **Supplementary material 5b** page 20-21. Or report directly to the COSMIN methodology for assessing the content validity of PROMs, user manual, version 1.0. https://cosmin.nl/wp-content/uploads/COSMIN-methodology-for-content-validity-user-manual-v1.pdf