

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Ahrweiler et al., 2014 ¹⁵³	Determinants of physician empathy during medical education: hypothetical conclusions from an exploratory qualitative survey of practicing physicians	Germany	Empathy	--	Physicians	42	33.3% internal medicine; 26.2% pediatrics; 14.3% rehabilitation; 11.9% general medicine; others <5%	67%	Qualitative	Qualitative description/thematic analysis	Reflective writing/open-ended written questionnaires
Alcorta-Garza et al., 2016 ⁹⁴	Cross-validation of the Spanish HP-version of the Jefferson scale of empathy confirmed with some cross-cultural differences	Spain and 13 Latin American countries (Mexico, Colombia, Bolivia, Argentina, Dominican Republic, Venezuela, Peru, Ecuador, Chile, Honduras, Cuba, El Salvador, and Uruguay)	Empathy	JSE	Physicians & physicians-in-training	715	36% hospital specialty; 34% non-hospital specialty; 10% no specialty; 9% surgical specialty; 7% medical-surgical specialty; 4% other	80%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Anandarajah & Roseman, 2014 ¹³⁶	A qualitative study of physicians' views on compassionate patient care and spirituality: medicine as a spiritual practice?	United States	Compassion	--	Residents	12	100% family medicine	92%	Qualitative	Qualitative description/thematic analysis	Interviews, Reflective writing/open-ended written questionnaires

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Aomatsu et al., 2013 ¹⁴²	Medical students' and residents' conceptual structure of empathy: a qualitative study	Japan	Empathy	--	Residents, medical students	13	NR	--	Qualitative	Qualitative description/thematic analysis	Focus groups
Avasarala, Whitehouse & Drake, 2015 ¹²²	Internship and empathy: variations across time and specialties	United States	Empathy, Empathic concern (EC)	IRI	Residents	74	17.6% emergency medicine; 2.7% otolaryngology; 5.4% family medicine; 47.3% internal medicine; 5.4% neurology; 2.7% orthopedics; 4.1% obstetrics and gynecology; 4.1% pathology; 4.1% psychiatry; 5.4% surgery; 1.4% urology	77%	Quantitative	Non-randomized exposure: Cohort study	Self-report (questionnaire)
Baker et al., 2018 ¹⁵¹	Compassionate care in the age of evidence-based practice: a critical discourse analysis in the context of chronic pain care	Canada	Compassion, Compassionate care (CC)	--	Physicians, residents (trainees)	9	100% chronic pain clinicians and trainees	--	Qualitative	Discourse analysis	Interviews, Text/document analysis
Bateman et al., 2017 ¹¹³	A qualitative examination of physician gender and parental status in pediatric end-of-life communication	United States	Empathy	--	Physicians	17	100% pediatricians (35% fellows, 65% attending physicians / 47% pediatric ED, 53% PICU)	81%	Qualitative	Grounded theory	Interviews

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Batley et al., 2016 ¹³⁸	Cynicism and other attitudes towards patients in an emergency department in a middle eastern tertiary care center	Lebanon	Empathy, cynicism	--	Physicians, residents, interns, medical students	30	100% emergency medicine	--	Qualitative	Qualitative description/thematic analysis	Interviews
Battegay et al., 1991 ¹⁸²	Exploring the doctor-patient relationship reduces staff stress and enhances empathy when caring for AIDS patients	Switzerland	Empathy	--	Physicians	11	--	--	Qualitative	Case study	Case study
Batton et al., 2011 ¹³³	Perspectives of physician parents in the NICU	United States	Compassion	Other non-standardized: Item "having an infant who required NICU admission has made me a more compassionate physician"	Physicians	57	--	89%	Mixed methods	Qualitative description/thematic analysis + Correlation/association study: Analytical cross-sectional	Reflective writing/open-ended written questionnaires + Self-report (questionnaire)

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Bayne et al., 2013³⁸	A comprehensive model for optimizing empathy in person-centered care	United States	Empathy, person-centered care	--	Physicians	21	Mixed: FM, Family Medicine; ID, Infectious Disease; MM, Maternal Fetal Medicine; OB, OBGYN; PS, Plastic Surgery; MS, Medical Student; GC, Grief Counselor; NP, Nurse Practitioner; GS, General Surgery; PN, Pathology/Neuropathology; NE, Nephrology; PD, Pediatrics; PSY, Psychiatry; GE, Geriatrics	--	Qualitative	Grounded theory	Interviews
Bellini, Baime & Shea, 2002⁶⁶	Variation of mood and empathy during internship	United States	Empathy	IRI	Interns	61	NR	Time 1 (98%), time 2 (72%), time 3 (79%), time 4 (79%)	Quantitative	Non-randomized exposure: Cohort study	Self-report (questionnaire)
Bellini & Shea, 2005⁶⁷	Mood change and empathy decline persist during three years of internal medicine training	United States	Empathy	IRI	Residents	61	--	From Time 1 to Time 6 (98%, 72%, 79%, 79%, 94%, and 95%, respectively).	Quantitative	Non-randomized exposure: Cohort study	Self-report (questionnaire)

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Bertakis, 2011 ¹⁰¹	Determinants and outcomes of patient-centered care	United States	Patient-centered care	Modified Davis Observation Code	Physicians, residents	105	Family practice 24.8%, general internal medicine 75.2%	Based on referred/link ed study (84% of patients)	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire), Assessed by coders (e.g., video- or audio recorded interview assessed by coders)
Bertakis & Azari, 2012 ¹⁷⁸	Patient-centered care: the influence of patient and resident physician gender and gender concordance in primary care.	United States	Patient-centered care	Modified Davis Observation Code	Physicians, residents	105	Family practice 24.8%, general internal medicine 75.2%	Based on other study (84% of patients)	Quantitative	Non-randomized exposure: Cohort study	Self-report (questionnaire), Assessed by coders (e.g., video- or audio recorded interview assessed by coders)
Bessen et al., 2019 ¹⁵⁴	"Sharing in hopes and worries" - a qualitative analysis of the delivery of compassionate care in palliative care and oncology at end of life	United States	Compassionate care (CC)	N/A - qualitative	Physicians	13	46.2% palliative care physicians; 53.8% medical oncologists	50%	Qualitative	Qualitative description/thematic analysis, Phenomenology	Interviews
Bishop et al., 2014 ¹⁶⁸	Efficient, compassionate, and fractured: contemporary care in the ICU	United Kingdom	Compassion, Compassionate care (CC)	--	Residents	12	100% ICU	--	Qualitative	Qualitative description/thematic analysis	Focus groups

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Borracci et al., 2015¹¹⁸	Measurement of empathy among Argentine cardiologists: psychometrics and differences by age, gender, and subspecialty	Argentina	Compassionate care (CC), Empathy	JSPE	Physicians	566	100% cardiologists (80.9% clinical; rest-other subspecialties)	63%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Brady, Bambury & O'Reilly, 2015⁷⁸	Empathy and the wounded healer: a mixed-method study of patients and doctors' views on empathy	Ireland	Empathy	JSPE	Physicians, medical students, patients	361	Mixed	54%	Mixed methods	Qualitative description/thematic analysis + Correlation/association study: Analytical cross-sectional	Reflective writing/open-ended written questionnaires + Self-report (questionnaire)
Branch et al., 2017¹⁴⁸	How physicians draw satisfaction and overcome barriers in their practices: "It sustains me"	United States	Humanistic care	--	Physicians	68	--	74%	Qualitative	Case study (small group course)	Reflective writing/open-ended written questionnaires
Bratek et al., 2015⁴⁹	Empathy among physicians, medical students and candidates	Poland	Empathy, Empathic concern (EC)	IRI	Physicians, residents, trainees, medical students, med. school candidates	96	Mixed		Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

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Butalid, Bensing & Verhaak, 2014 ¹⁸⁶	Talking about psychosocial problems: an observational study on changes in doctor-patient communication in general practice between 1977 and 2008	The Netherlands	Empathy	Communication patterns were rated using the Roter Interaction Analysis System (RIAS)	Physicians	204	100% family medicine	NA - retrospective study	Quantitative	Non-randomized exposure: (Interrupted) time-series, Analytical cross-sectional	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
Bylund & Makoul, 2002 ¹¹⁴	Empathic communication and gender in the physician-patient encounter	United States	Empathy	Empathic Communication Coding System (ECCS)	Physicians	20	100% internal medicine	--	Quantitative	Correlation/association study: Analytical cross-sectional	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
Bylund & Makoul, 2005 ¹⁸⁴	Examining empathy in medical encounters: an observational study using the empathic communication coding system	United States	Empathy	Empathic Communication Coding System (ECCS)	Physicians	20 physicians (100 patients)	100% internal medicine	--	Quantitative	Correlation/association study: Analytical cross-sectional	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)

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Carmel & Glick, 1996 ⁵⁰	Compassionate-empathic physicians: personality traits and social-organizational factors that enhance or inhibit this behavior pattern	Israel	Compassionate-empathic physicians	IRI	Physicians	214	General (28%); Surgery (22%); Gynecology (16%); Pediatrics (14%); Other (20%)	70%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire), Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
Chaitoff et al., 2017 ⁹⁹	Associations between physician empathy, physician characteristics, and standardized measures of patient experience	United States	Empathy	JSE	Physicians	847	Mixed	76%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Charles et al., 2018 ⁵¹	Empathy variation in general practice: a survey among general practitioners in Denmark	Denmark	Empathy	JSPE	Physicians	464	100% family medicine	39%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

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Chou, Kellom & Shea, 2014⁸⁹	Attitudes and habits of highly humanistic physicians	United States	Humanistic care	--	Physicians	16	General medicine 44%; pulmonary/critical care 25%; hematology/oncology 13%; infectious disease 13%; gastrointestinal 6%	74% of approached residents - humanistic attending physicians represented 15.5% (92) of the faculty, selected 16 (mentioned >5 times) - 100% response	Qualitative	Qualitative description/thematic analysis	Interviews
Cicekci et al., 2017⁹⁵	The communication between patient relatives and physicians in intensive care units	Turkey	Empathy	Questionnaire based on the patient-physician communication questionnaire that was developed by Curtis et al. (2004) for chronic obstructive pulmonary disease patients in serious condition [validated in a pilot study]	Physicians, patients' families	103	55% anesthesiology; 14% pulmonology; 9% cardiovascular surgery; 8% internal medicine; 3% surgery; 12% ED.	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

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Clara et al., 2006 ³⁹	The vascular surgeon facing clinical ethical dilemmas (the VASCUETHICS Study): 'V'-shaped association between compassionate attitudes and professional seniority	Spain	Compassion	CED - clinical ethical dilemmas	Physicians	153	100% surgery: vascular surgeons	88%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire), Behavioral task
Crowe & Brugha, 2018 ¹⁵⁶	"We've all had patients who've died ...": narratives of emotion and ideals of competence among junior doctors	Ireland	Empathy	--	Physicians, residents	50	--	--	Qualitative	Qualitative description/thematic analysis, Case study	Interviews
Cyrus et al., 2017 ⁸³	Empathic communication and essential instruction for medical students	Iran	Empathy	JSE, Empathy also anonymously reported by another physician	Residents, trainees, interns	215	Mixed	90%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Daidsen & Fosgerau, 2014 ¹⁰⁰	General practitioners' and psychiatrists' responses to emotional disclosures in patients with depression	Denmark	Empathic opportunity response	--	Physicians	23	52.2% GPs, 47.8% psychiatrists	--	Qualitative	Discourse analysis	Conversation analysis

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Dehning et al., 2014 ¹¹⁵	Empathy in high-tech and high-touch medicine	Germany	Empathy	JSPE, BEES, Reading the mind in the eyes test	Physicians	116	Surgery 50%; psychiatry 50%	93% surgeons, 86% psychiatrists	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Derksen et al., 2015 ⁸⁷	Empathy: what does it mean for GPs? A qualitative study	The Netherlands	Empathy	--	Physicians	31	100% family medicine	31% of 100 (21% of all but sufficient variety so did not reach out to other 48%)	Qualitative	Iterative content analysis	Interviews
Derksen et al., 2016 ¹⁴⁹	Managing barriers to empathy in the clinical encounter: a qualitative interview study with GPs	The Netherlands	Empathy	--	Physicians	31	100% family medicine	31% of 100 (21% of all but sufficient variety so did not reach out to other 48%)	Qualitative	Iterative content analysis	Interviews
Derksen et al., 2018 ¹⁴⁶	Empathy in general practice-the gap between wishes and reality: comparing the views of patients and physicians	The Netherlands	Empathy	--	Physicians, patients	31	100% family medicine	31%	Qualitative	Qualitative description/thematic analysis	Interviews
Dhawan, Steinbach & Halpern, 2007 ¹⁰⁹	Physician empathy and compassion for inmate-patients in the correctional health care setting	United States	Empathy	IRI	Physicians	78	68% primary care; 13% psychiatric; 19% other	19%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

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Di Lillo et al., 2009 ⁷⁹	The Jefferson Scale of Physician Empathy: preliminary psychometrics and group comparisons in Italian physicians	Italy	Empathy	JSPE	Physicians	289	27% medical; 73% surgical	37%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Epstein & Borrelli, 2001 ¹²⁵	Pudor, honor, and autoridad: the evolving patient-physician relationship in Spain	Spain	Empathy	--	Physicians	20	100% family medicine		Qualitative	Qualitative description/thematic analysis, Ethnography	Interviews, Participant observation
Epstein et al., 2007 ¹⁸⁵	"Could this be something serious?" Reassurance, uncertainty, and empathy in response to patients' expressions of worry	United States	Empathic opportunity response	--	Physicians	100	47% GPs, 53% Internists	33%	Mixed methods	Qualitative description/thematic analysis + Correlation/association study: Analytical cross-sectional	Participant observation + Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)

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Ferreira, Afons & Ramos, 2020⁸⁴	Empathy and burnout: a multicentre comparative study between residents and specialists	Portugal	Empathy	JSE	Physicians	104	13% Internal medicine; 8% Infectious diseases; 8% General practice; 8% Pediatrics; 7% Psychiatry; 7% Obstetrics and gynecology; 13% General surgery; 7% Orthopedics; 8% Plastic surgery; 7% Urology; 8% Otorhinolaryngology; 8% Ophthalmology	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Foo et al., 2017¹¹²	Patient and physician race and the allocation of time and patient engagement efforts to mental health discussions in primary care: an observational study of audiorecorded periodic health examinations	United States	Empathy	Multidimensional interaction analysis (MDIA) coding system	Physicians	59 physicians (322 patients)	71% general internal medicine; 29% family medicine	47%	Quantitative	Correlation/association study: Analytical cross-sectional	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)

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Foreback et al., 2018 ⁶²	Empathy in internal medicine residents at community-based hospitals: a cross-sectional study	United States	Empathy	JSE	Residents	45	100% internal medicine	35%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Fox et al., 2009 ¹²⁸	Experiencing "the other side": a study of empathy and empowerment in general practitioners who have been patients	United Kingdom	Empathy	--	Physicians	17	100% family medicine	100%	Qualitative	Phenomenology (IPA)	Interviews
Fulop et al., 2011 ¹⁴⁰	Relationship between empathy and burnout among psychiatric residents	Hungary	Empathy	IRI	Residents	67	--	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Gateshill, Kucharska-Pietura & Wattis, 2011 ¹¹⁰	Attitudes towards mental disorders and emotional empathy in mental health and other healthcare professionals	England	Empathy	BEES	Physicians	118	--	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Gilligan et al., 2019 ¹⁶⁰	Views of institutional leaders on maintaining humanism in today's practice	United States	Compassion	N/A - qualitative	Physicians, Institutional leaders (81% physicians)	32	--	--	Qualitative	Qualitative description/thematic analysis	Interviews, Reflective writing/open-ended written questionnaires

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Gleichgerrcht & Decety, 2013 ⁵²	Empathy in clinical practice: how individual dispositions, gender, and experience moderate empathic concern, burnout, and emotional distress in physicians	Latin American countries (20); 47% Argentina	Empathy, Empathic concern (EC)	IRI	Physicians, Residents	7,584	Mixed	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Gottenborg et al., 2018 ¹³⁹	You can't have it all: the experience of academic hospitalists during pregnancy, parental leave, and return to work	United States	Empathy	--	Physicians	10	--	100%	Qualitative	Qualitative description/thematic analysis	Interviews
Greenberg et al., 2015 ⁷⁰	Empathy, sense of power, and personality: do they change during pediatric residency?	United States	Empathy, Empathic concern (EC)	IRI	Residents	T1 = 34, T2 = 25	100% pediatrics	100% - 74%	Quantitative	Non-randomized exposure: Cohort study	Self-report (questionnaire)
Haider, Riaz & Gill, 2020 ¹²⁷	Empathy in clinical practice: a qualitative study of early medical practitioners and educators	Pakistan	Empathy	--	Physicians, residents, medical students, physicians/clinical teachers	109	52.3% medical students; 27.5% residents; 20.2% clinical teachers	--	Qualitative	Qualitative description/thematic analysis	Focus groups

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Handford et al., 2013 ⁴⁰	Empathy as a function of clinical exposure - reading emotion in the eyes	Australia	Empathy	IRI, EQ Baron Cohen, Reading the mind in the eyes test	Physicians, medical students	20	Mixed	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire), Behavioral task, Heart Rate
Hayuni et al., 2019 ¹⁶¹	Between empathy and grief: The mediating effect of compassion fatigue among oncologists	Israel	Empathy	IRI	Physicians	71	100% oncology (26.8% breast; 11.3% lung; 16.9% hematology; 21.1% other; 12.7% no specialty)	61%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Hojat et al., 2002a ⁹⁶	Physician empathy: definition, components, measurement, and relationship to gender and specialty	United States	Empathy	JSPE	Physicians	704	12 specialty groups, most frequent are internal Medicine (9%); Pediatrics (11%); Family Medicine (10%)	70%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Hojat et al., 2002b ⁹²	The Jefferson Scale of Physician Empathy: further psychometric data and differences by gender and specialty at item level	United States	Empathy	JSE	Physicians	704	66% "people-oriented" specialties (e.g., family medicine, emergency medicine); 34% "technology-orientated" specialties (e.g., hospital-based specialties like anesthesiology, radiology)	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

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Hojat et al., 2005 ¹⁴¹	Empathy scores in medical school and ratings of empathic behavior in residency training 3 years later	United States	Empathy	JSPE, Empathic behavior in residency training by a postgraduate-rating form (Hojat, Veloski, & Borenstein, 1986)	Residents	106	39% internal medicine; 16% family medicine; 13% emergency; 10% surgery; 7% pediatrics; 14% other	50%	Quantitative	Non-randomized exposure: Cohort study	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
Hong et al., 2011 ⁶³	Empathy in Korean psychiatric residents	South Korea	Empathy	JSPE	Residents	319	100% psychiatry	53%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Jaye & Wilson, 2003 ¹²⁹	When general practitioners become patients	New Zealand	Empathy	--	Physicians	26	100% family medicine	18%	Qualitative	Qualitative description/thematic analysis	Interviews
Jiao et al., 2014 ⁵³	Cross-sectional study of attitudes about suicide among psychiatrists in Shanghai	China	Empathy	The Scale of Public Attitudes about Suicide (SPAS) - empathy subscale (4)	Physicians	179	100% psychiatry	96%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Jin et al., 2020 ¹⁰⁶	The mediating role of psychological capital on the relation between distress and empathy of medical residents: a cross-sectional survey	China	Empathy	JSPE	Residents	537	33.33% internal medicine; 23.06% surgery; 5.4% obstetrics and gynecology; 2.88% pediatrics; 8.65% dentistry; 26.49% other;	87%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

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Jing, Jin & Liu, 2019 ⁸⁵	The impact of monetary incentives on physician prosocial behavior in online medical consulting platforms: evidence from China	China	Physician prosocial behavior	Other non-standardized: Physicians' prosocial behaviors were the free consulting services offered by physicians in an online health care community, measured by the logged volume of free answers in each month	Physicians	26,543	--	--	Quantitative	Non-randomized exposure: Before-and-after study (controlled)	Behavioral task
Johnson Shen et al., 2019 ¹⁷⁶	Structured analysis of empathic opportunities and physician responses during lung cancer patient-physician consultations	United States	Empathic opportunity response	Empathic Communication Coding System (ECCS)	Physicians	11 physicians (56 patients)	100% oncology: lung cancer physicians	70%	Quantitative	Correlation/association study: Analytical cross-sectional	Assessed by coders (e.g., video- or audio recorded interview assessed by coders), Behavioral task
Julia-Sanchis et al., 2019 ⁴¹	Measuring the levels of burnout syndrome and empathy of Spanish emergency medical service professionals	Spain	Empathy	BEES	Physicians, nurses, nursing assistants, porters, emergency healthcare technicians	544	multidisciplinary	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

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Kataoka et al., 2012⁴²	Measurement and correlates of empathy among female Japanese physicians	Japan	Empathy	JSE	Physicians	285	Mixed	21%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Katsari et al., 2020⁴³	Physicians' self-assessed empathy and patients' perceptions of physicians' empathy: validation of the Greek Jefferson scale of patient perception of physician empathy	Greece	Empathy	JSPE	Physicians	17	100% internal medicine	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Kealy et al., 2016¹⁶²	Burnout among Canadian psychiatry residents: a national survey	Canada	Empathy	Other non-standardized: "Likert-scale items were used to assess residents' appraisals of empathic functioning"	Residents	400	100% psychiatry	48%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Kemper et al., 2020¹⁵⁸	Burnout in pediatric residents: three years of national survey data	United States	Empathy, Empathic concern (EC)	IRI	Residents	Cohort1 N=2723, Cohort2 N=3273, Cohort3 N=3657	100% pediatrics	61% - 66% - 61%	Quantitative	Non-randomized exposure: Cohort study, Analytical cross-sectional	Self-report (questionnaire)

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Kennifer et al., 2009 ¹⁷⁵	Negative emotions in cancer care: do oncologists' responses depend on severity and type of emotion?	United States	Empathy	Other non-standardized: Developed their own codebook to code empathic responses	Physicians	48	100% oncologists	--	Quantitative	Correlation/association study: Analytical cross-sectional	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
Kerasidou & Kingori, 2019 ¹⁷¹	Austerity measures and the transforming role of A&E professionals in a weakening welfare system	England	Empathy	--	Physicians, nurses	16	100% emergency medicine	--	Qualitative	Qualitative description/thematic analysis	Interviews
Kerasidou, 2019 ¹⁶⁹	Empathy and efficiency in healthcare at times of austerity	England	Compassion, Empathy	--	Physicians, nurses	16	100% emergency medicine	--	Qualitative	Qualitative description/thematic analysis	Interviews
Khajavi & Hekmat, 1971 ⁷¹	A comparative study of empathy: the effects of psychiatric training	United States	Empathy	Hogan's empathy scale	Physicians, residents, social workers, nurses, psychologists	Study 1: 106; Study 2: 52	100% psychiatric	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Kirmayer, 2008 ¹²⁶	Empathy and alterity in cultural psychiatry	Canada	Empathy	--	Residents	1	100% psychiatry	--	Qualitative	Case study	Case study presented at the conference
Kliszcz et al., 2006 ¹¹⁶	Empathy in health care providers - validation study of the Polish version of the Jefferson Scale of Empathy	Poland	Empathy	JSE, IRI	Physicians, medical students, nurses; nursing students, midwife students	118	No specialization or internists and pediatricians gaining specialization in family medicine	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Kobayasi et al., 2018¹¹⁹	Gender differences in the perception of quality of life during internal medicine training: a qualitative and quantitative analysis	Brazil	Empathy	JSE	Residents	109	100% internal medicine	91%	Mixed methods	Qualitative description/thematic analysis + Correlation/association study: Analytical cross-sectional	Focus groups + Self-report (questionnaire)
Komisar & McFarland , 2017¹²³	Is empathy associated with a self-ascribed sense of meaning among resident physicians working with patients nearing the end of life on a hematology-oncology ward?	United States	Empathy	IRI	Residents, interns	64	NR	67%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Kondo et al., 2013⁵⁴	Characteristics associated with empathic behavior in Japanese oncologists	Japan	Empathy	Fujimori M, Akechi T, Morita T, Inagaki M, Akizuki N, Sakano Y, et al. Preferences of cancer patients regarding the disclosure of bad news.	Physicians	60	100% oncology; mostly surgery (56.7%) and internal medicine (41.7%)	--	Quantitative	Correlation/association study: Analytical cross-sectional	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders), Behavioral task

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Kozeny & Tisanska, 2013⁵⁵	The structure of the Jefferson Scale of Physician Empathy in Czech physicians	Czech Republic	Empathy	JSE	Physicians	1305	16.7% general practitioners; 13.3% gynecology; 13.4% internal medicine; 11.6% surgery; 9.5% pediatrics; 3.7% otorhinolaryngology, orthopedics, neurology, dermatology, psychiatry, ophthalmology; 1.8% cardiology, urology, allergology, oncology, geriatrics, anesthesiology, endocrinology	84%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Krenek & Zalewski, 1993¹³⁴	Psychiatric illness in families of mental health professionals: Relationship to career choice and self-perceived therapeutic variables	United States	Empathy	Other non-standardized: Did not state questionnaire just "questions related to feelings of empathy to psychiatric patients"	Physicians, psychologists	265	44% psychiatrists; 56% family practice physicians	23%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Lases et al., 2019¹⁷²	Learning climate positively influences residents' work-related well-being	The Netherlands	Empathy	JSPE	Residents	144	77.1% surgery; 22.9% gynecology	53%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Lebowitz & Ahn, 2014 ¹⁸⁹	Effects of biological explanations for mental disorders on clinicians' empathy	United States	Empathy	Other non-standardized: via adjectives, but used before and validated	Physicians	N1=132; N2=105; N3=106	100% psychiatry/mental health clinicians	16.88%, 14.19%, 12.83%	Quantitative	Non-randomized exposure: non-randomized trial	Self-report (questionnaire), Behavioral task
Lee et al., 2018 ⁷²	Empathy and burnout: a study on residents from a Singapore institution	Singapore	Compassionate care (CC), Empathy	JSPE	Residents	446	56.4% medical, 46.6% surgical	51%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Lelorain et al., 2013 ⁵⁶	Empathic concern and professional characteristics associated with clinical empathy in French general practitioners	France	Empathy, Empathic concern (EC)	JSPE, Toronto Empathy Questionnaire	Physicians	295	100% family medicine	37%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Lin, Hsu & Chong, 2008 ¹⁵⁷	Differences between emergency patients and their doctors in the perception of physician empathy: implications for medical education	China (Taiwan)	Empathy	--	Physicians, nurses	14	100% emergency medicine	--	Qualitative	Phenomenology	Interviews

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Lown, Shin & Jones, 2019 ⁵⁷	Can organizational leaders sustain compassionate, patient-centered care and mitigate burnout?	United States	Compassionate care (CC)	Schwartz Center Compassionate Care Scale (SCCCS)	Physicians	380	38% primary care; 60% specialist	62%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
*Lyness, 1993 ¹⁴⁷	Physicians' use of empathy in response to patients' emotional concerns	United States	Empathy	Other non-standardized: Own coding structure	Residents	22	100% Pediatrics	--	Qualitative	Qualitative description/thematic analysis	Interviews
Mahoney, Sladek & Neild, 2016 ¹⁰⁷	A longitudinal study of empathy in pre-clinical and clinical medical students and clinical supervisors	Australia	Empathy	JSE	Physicians, medical students	151	Public - mixed (no family medicine); private - 70.5% GPs	13% and 9.1% (public/private doctors)	Mixed methods	Qualitative description/thematic analysis + Correlation/association study: Analytical cross-sectional	Reflective writing/open-ended written questionnaires + Self-report (questionnaire)
Mangione et al., 2002 ⁷³	Assessment of empathy in different years of internal medicine training	United States	Empathy	JSPE, ABIM definition (ABIM, 1988)	Residents	98	100% internal medicine	84%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire), Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
McFarland & Roth, 2017 ¹⁰⁵	Resilience of internal medicine house staff and its association with distress and empathy in an oncology setting	United States	Empathy, Empathic concern (EC)	IRI	Residents, interns	T1 = 82, T2 = 56	100% oncology: hematology-oncology rotations	T1 - 85% T2 - 58%	Quantitative	Non-randomized exposure: Before-and-after study (uncontrolled)	Self-report (questionnaire)
McFarland, Malone & Roth, 2017 ¹⁰⁴	Acute empathy decline among resident physician trainees on a hematology-oncology ward: an exploratory analysis of house staff empathy, distress, and patient death exposure	United States	Empathy, Empathic concern (EC)	IRI	Residents, interns	T1 = 82, T2 = 56	100% oncology: hematology-oncology rotations	T1 - 85% T2 - 58%	Quantitative	Non-randomized exposure: Before-and-after study (uncontrolled)	Self-report (questionnaire)
McManus et al., 2011 ¹⁶⁶	Vocation and avocation: Leisure activities correlate with professional engagement, but not burnout, in a cross-sectional survey of UK doctors	United Kingdom	Empathy	IRI	Physicians	2845	NR	64%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Meeuwesen et al., 2006 ¹⁷⁴	Do Dutch doctors communicate differently with immigrant patients than with Dutch patients?	The Netherlands	Empathy	Roter's Interaction Analysis System (RIAS) coding	Physicians	31 physicians (144 patients)	100% family medicine	42% for patients; NR for GPs	Quantitative	Correlation/association study: Analytical cross-sectional	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
Mills, Wand & Fraser, 2018 ¹⁵⁵	Exploring the meaning and practice of self-care among palliative care nurses and doctors: a qualitative study	Australia	Compassion	--	Physicians, nurses	12	100% palliative care	--	Qualitative	Qualitative description/thematic analysis	Interviews
Moralle et al., 2016 ¹¹¹	An exploratory study of empathy in resident physicians at an urban medical center	United States	Empathy	JSE	Residents	172	NR	36%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Moriarty et al., 2020 ⁸⁰	General practitioners' training and their attitudes towards young people who self-harm: a cross-sectional survey	Ireland	Empathy	Self-harm knowledge, attitudes, and empathy	Physicians	225	100% family medicine	Not possible to calculate due to snowballing recruitment	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Muggleton, Guy & Howard, 2015 ¹⁸⁸	Breaking the taboo: an interpretative phenomenological analysis of healthcare professionals' experience of caring for palliative patients with disgusting symptoms	United Kingdom	Empathy, caring behavior	--	Physicians, nurses, OTs	6	100% palliative care	--	Qualitative	Phenomenology (IPA)	Interviews, Participant observation
Muslin & Schlessinger, 1971 ¹⁴³	Toward the teaching and learning of empathy	United States	Empathy	--	Residents	--	--	--	Qualitative	Qualitative description/thematic analysis	Reflective writing/open-ended written questionnaires, Participant observation, Observation and reflection on videotaped interviews

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Osim et al., 2019⁸⁶	The Jefferson scale of physician empathy: a preliminary study of validity and reliability among physicians in Nigerian tertiary hospital	Nigeria	Empathy	JSE	Physicians	120	18.3% Surgery; 15.8% Internal medicine; 14.2% Obstetrics and Gynecology; 15.2% Family Medicine; 11.7% Pediatrics; 10% Laboratory Medicine; 5.8% Anesthesiology; 5% Community medicine; 6.7% Radiology	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Paasche-Orlow & Roter, 2003¹⁰³	The communication patterns of internal medicine and family practice physicians	United States	Empathy	Roter Interaction Analysis System (RIAS) coding	Physicians	59	49% family physicians; 51% internists	16%	Quantitative	Correlation/association study: Analytical cross-sectional	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
Pardeshi et al., 2017⁸⁸	Resident doctors' attitudes toward tuberculosis patients	India	Compassion	Other non-standardized: Feeling compassion/desire to help	Residents	305	--	94%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Park et al., 2016 ⁶⁴	A multicenter study investigating empathy and burnout characteristics in medical residents with various specialties	South Korea	Empathy	JSPE	Residents	317	27 different specialty training areas	42%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Park et al., 2018 ¹⁸¹	Emotional communication in HIV care: an observational study of patients' expressed emotional needs	United States	Empathy	Verona Coding Definitions of Emotional Sequences (VR-CoDES)	Physicians	17 physicians (43 patients)	100% HIV clinicians	--	Quantitative	Correlation/association study: Analytical cross-sectional	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
*Passalacqua, 2011 ¹⁶³	"Running on empty": examining the effect of physician stress, burnout, and empathy on patient-centered communication during the long-call shift	United States	Empathy	State empathy (Tsang & Stanfords 2007)	Residents	93	--	--	Quantitative	Non-randomized exposure: Cohort study	Self-report (questionnaire)

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Paul-Savoie et al., 2018⁴⁴	The impact of pain invisibility on patient-centered care and empathetic attitude in chronic pain management	Canada	Patient-centered orientation	JSPE, Patient Practitioner Orientation Scale (F-PPOS); Sherbrooke Observation Scale of patient-centered care (SOS-PCC) - observed; Reynolds Empathy Scale (F-RES) - observed	Physicians, nurses	21	50% physicians; 50% nurses	--	Quantitative	Non-randomized exposure: Case-control study	Self-report (questionnaire), Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders), Behavioral task
Pawlikowski, Sak & Marczewski, 2012¹³⁷	Physicians' religiosity and attitudes towards patients	Poland	Empathy	Scale of Attitude towards the Patient (SAAtP)	Physicians	324	52% working in surgical units; 48% non-surgical	61%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Peng, Clarkin & Doja, 2018¹⁴⁵	Uncovering cynicism in medical training: a qualitative analysis of medical online discussion forums	United States, Canada	Cynicism	N/A - qualitative	Residents, medical students, faculty; Pharmacy and dentistry (unsure whether students/professionals though)	511 posts, 205 posters	--	--	Qualitative	Qualitative description/thematic analysis, Narrative research (i.e., life experience), Discourse analysis	Content analysis (e.g., forums)

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Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Pensek & Selic, 2018 ¹³⁰	Empathy and burnout in Slovenian family medicine doctors: the first presentation of Jefferson scale of empathy results	Slovenia	Empathy	JSE	Physicians, trainees	316	100% family medicine	56%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
*Petrahai & Nwangwu, 2003 ⁷⁴	A study of empathy in emergency medicine residents at a Connecticut residency program	United States	Empathy	JSE	Residents	31	100% emergency medicine	97%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Picard et al., 2016 ⁹³	Burnout, empathy and their relationships: a qualitative study with residents in General Medicine	France	Empathy	N/A - qualitative	Residents	24	100% family medicine	92%	Qualitative	Qualitative description/thematic analysis	Interviews
Pinder, 1992 ¹⁵²	Striking balances: detachment or empathy in the management of Parkinson's disease?	United Kingdom	Empathy	N/A - qualitative	Physicians	18	100% family medicine	--	Qualitative	Qualitative description/thematic analysis	Interviews

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Pollak et al., 2007 ⁵⁸	Oncologist communication about emotion during visits with patients with advanced cancer	United States	Empathic opportunity response	Continuers consisted of five behaviors that have been organized by educators under the mnemonic NURSE: Name, Understand, Respect, Support, and Explore.	Physicians	74 physicians (398 audio-recordings)	100% oncologists: 90% medical oncologists, 8% gynecological oncologists, 2% radiation oncologists	67%	Quantitative	Correlation/association study: Analytical cross-sectional	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
Pollak et al., 2010 ¹⁷⁹	Do patient attributes predict oncologist empathic responses and patient perceptions of empathy?	United States	Empathic opportunity response	Suchman's definitions of empathic opportunities and oncologists' responses to them	Physicians	74 physicians (264 audio-recordings)	100% oncology	67%	Quantitative	Correlation/association study: Analytical cross-sectional	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)

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Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Polonsky et al., 2014 ¹⁸³	Physicians' challenges when discussing the type 2 diabetes diagnosis with patients: Insights from a cross-national study (IntroDiaTM)	Argentina, Australia, Austria, Brazil, Bulgaria, Canada, China, Denmark, France, Germany, India, Indonesia, Israel, Japan, South Korea, Mexico, the Netherlands, Norway, the Philippines, Russia, Saudi Arabia, South Africa, Spain, the United Arab Emirates, the United Kingdom (UK) and the United States of America (USA).	Empathy	JSE	Physicians	6,753	91.6% primary care physicians; 8.4% specialists (6.8% endocrinologist, 0.8% cardiologists, 0.7% diabetologist)	73%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

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Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Porte et al., 2018 ¹⁵⁹	Has the quality of health care for the immigrant population changed during the economic crisis in Catalonia (Spain)? Opinions of health professionals and immigrant users	Spain	Empathy	--	Physicians, administrative health workers	34	55.9% GPs; 44.1% specialists	--	Qualitative	Qualitative description/thematic analysis	Interviews
*Psyhojos, 2017 ¹⁰⁸	Aging, empathy, and the Internet of Things: a measure of physician readiness to treat older adults	United States	Empathy	JSPE	Physicians	354	Pediatrics 12.4%, family medicine 11.3%, surgery 11.6%	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Putrino et al., 2018 ⁵⁹	Are there differences in health professionals' empathy due to academic and clinical experience?	Argentina	Empathy	IRI, Reading the mind in the eyes test	Physicians, medical students	33	--	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire), Behavioral task
Rawal, Strahlendorf & Nimmon, 2020 ⁶⁵	Challenging the myth of the attrition of empathy in pediatrics residents	Canada	Empathy	--	Residents	10	100% pediatrics	--	Qualitative	Phenomenology	Interviews

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Reed et al., 2018 ⁷⁵	Variability of burnout and stress measures in pediatric residents: an exploratory single-center study from the pediatric resident burnout-resilience study consortium	United States	Empathy, Empathic concern (EC)	IRI	Residents	109	100% pediatrics	74%	Quantitative	Non-randomized exposure: Cohort study, Analytical cross-sectional	Self-report (questionnaire)
Rider et al., 2018 ¹⁷⁰	Healthcare at the crossroads: the need to shape an organizational culture of humanistic teaching and practice	United States	Compassion, humanism	--	Physicians (faculty physicians)	68	100% family medicine	74%	Qualitative	Qualitative description/thematic analysis	Reflective writing/open-ended written questionnaires
Roberts et al., 2011 ⁴⁵	Are doctors who have been ill more compassionate? Attitudes of resident physicians regarding personal health issues and the expression of compassion in clinical care	United States	Compassion, Empathy	Other non-standardized: attitudes concerning compassion and empathy with patients in relation to their own and family members' personal health care	Residents	155	46% primary care; 54% specialties	71%	Mixed methods	Qualitative description/thematic analysis + Correlation/association study: Analytical cross-sectional	Reflective writing/open-ended written questionnaires + Self-report (questionnaire)

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Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Rosen et al., 2006 ⁶⁸	Evolution of sleep quantity, sleep deprivation, mood disturbances, empathy, and burnout among interns	United States	Empathy, Empathic concern (EC)	IRI	Residents	T1 = 58, T1 and T2 = 47	NR	98.3% - 79.7%	Quantitative	Non-randomized exposure: Cohort study	Self-report (questionnaire)
*Ross & Indart, 2017 ¹⁵⁰	"This will only hurt a bit": evaluating the usage of patient focused empathy amongst general surgery residents	United States	Empathy	JSE	Residents	25	100% surgery	50%	Mixed methods	Qualitative description/thematic analysis + Correlation/association study: Analytical cross-sectional	Reflective writing/open-ended written questionnaires + Self-report (questionnaire)
Roth, Burgess & Mahowald, 2007 ¹⁸⁷	Medical residents' beliefs and concerns about using opioids to treat chronic cancer and noncancer pain: a pilot study	United States	Empathy	Other non-standardized: Developed own 28-item to assess residents' perceptions of efficacy and safety of using opioids to treat pain in non-cancer and cancer patient samples	Residents	72	78% general medicine; 22% pediatrics	75%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Roze des Ordon et al., 2020 ¹⁶⁷	Compassion in the clinical context: constrained, distributed, and adaptive	Canada	Compassion	--	Physicians although mixed (physicians and nurses)	6	Critical care (50%); Palliative care (50%)	--	Qualitative	Ethnography, Phenomenology	Interviews, Focus groups, Participant observation

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PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Rubinstein & Bentwich, 2017¹⁸⁰	The enemy as a patient: what can be learned from the emotional experience of physicians and why does it matter ethically?	Israel	Empathy	N/A - qualitative	Physicians	10	20% OB/GYN; 40% orthopedics; 30% surgery; 10% pediatrics	--	Qualitative	Phenomenology	Interviews
Saguem et al., 2020⁷⁶	Empathic abilities and their mediators in Tunisian psychiatry trainees.	Tunisia	Empathy, Empathic concern (EC)	IRI	Trainees	120	Mental health/illness	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Salyers et al., 2015¹⁶⁴	Clinicians' perceptions of how burnout affects their work	United States	Empathy	--	Physicians	123	--	--	Mixed methods	Correlation/association study: Analytical cross-sectional + Qualitative description/thematic analysis	Self-report (questionnaire)+ Reflective writing/open-ended written questionnaires
Sandikci et al., 2017¹⁰²	Attitudes and behaviors of physicians in dealing with difficult patients and relatives: a cross-sectional study in two training and research hospitals	Turkey	Empathy	Other non-standardized: Developed their own survey measuring attitudes and behaviors of physicians in coping with difficult patients and their relatives.	Physicians, Residents	400	38.3% serving in internal branches; 32.5% serving in surgical branches; 26% in family medicine	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

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PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Santamaria-Garcia et al., 2017 ⁴⁶	Empathy for others' suffering and its mediators in mental health professionals	Latin-American countries	Empathic concern (EC)	IRI, Empathy for pain task (EPT), Moral judgment	Physicians, residents, non-medical	Study 1: 1109; Study 2: experiment of 42 general-physicians, and a group of 28 non-medical workers	16.7% psychiatrists, 36.2% GPs	--	Quantitative	Non-randomized exposure: non-randomized trial	Self-report (questionnaire), Behavioral task
*Scott, 2011 ¹⁴⁴	Empathy in healthcare settings	United Kingdom	Empathic concern (EC)	IRI	Physicians, psychology students	297	100% family medicine	75%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Shanafelt et al., 2005 ⁷⁷	Relationship between increased personal well-being and enhanced empathy among internal medicine residents	United States	Empathy	IRI	Residents	83	categorical internal medicine and preliminary internal medicine	50%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Shariat, Eshtad & Ansari, 2010 ⁴⁷	Empathy and its correlates in Iranian physicians: a preliminary psychometric study of the Jefferson Scale of Physician Empathy	Iran	Empathy	JSPE	Physicians	207	100% family medicine	75%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

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Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Silvester et al., 2007 ¹²⁰	"Trust me...": psychological and behavioral predictors of perceived physician empathy	United Kingdom	Empathy	Other non-standardized: "a capacity and motivation to take in patient/colleague perspective, and sense associated feelings—the ability to generate a safe/understanding atmosphere"	Physicians	100	100% family medicine	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire), Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
Stanton et al., 2011 ⁹⁷	Comparison of emotional intelligence between psychiatrists and surgeons	England	Empathy	Bar-On Emotional Quotient Inventory (Bar-On EQ-i)	Physicians	148	61% psychiatrists; 39% surgeons	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Stein, 1986 ¹⁷⁷	'Sick people' and 'trolls': a contribution to the understanding of the dynamics of physician explanatory models	United States	Empathy	--	Physicians	1	--	--	Qualitative	Case study	Case study
Stratta, Riding & Baker, 2016 ⁹⁸	Ethical erosion in newly qualified doctors: perceptions of empathy decline	United Kingdom	Empathy	--	Physicians	9	--	23%	Qualitative	Qualitative description/thematic analysis	Interviews

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PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Street, Gordon & Haidet, 2007¹²¹	Physicians' communication and perceptions of patients: is it how they look, how they talk, or is it just the doctor?	United States	Empathy	Global affect scales of the Roter Interaction Analysis System	Physicians	29 physicians (270 patients)	Family practice, general internal medicine (% not reported)	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire), Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
Suh et al., 2012⁸¹	The Jefferson Scale of Physician Empathy: a preliminary psychometric study and group comparisons in Korean physicians	South Korea	Empathy	JSPE	Physicians	229	mixed	100%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Swendiman et al., 2019⁹⁰	Attitudes and habits of highly humanistic surgeons: a single-institution, mixed methods study.	United States	Humanistic care	--	Physicians	10	100% surgeons	Defined by saturation	Qualitative	Qualitative description/thematic analysis	Interviews

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Uygun, Brown & Herbert, 2019¹³¹	Understanding compassion in family medicine: a qualitative study	Canada	Compassion	--	Physicians, residents, trainees	22	100% family physicians of which 59% worked in the community; co-specialization: 54.5% geriatric/long-term care; 40.9% acute hospital medicine; 23% ED; 9% palliative; 9% inner city; 5% obstetrics	--	Qualitative	Phenomenology	Interviews
van Hoorn et al., 2019¹⁷³	Missed empathic opportunities during hand surgery office visits	United States	Empathy	--	Physicians	3 physicians (83 patients)	100% surgery: hand surgeons	--	Quantitative	Non-randomized exposure: Case-control study	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
Walocha et al., 2013¹⁶⁵	Empathy and burnout among physicians of different specialties	Poland	Empathy	Epstein Emotional Empathy Scale; Thematic Apperception Test (TAT) by Murray	Physicians	71	40.8% primary care; 32.4% non-surgical; 26.8% - surgical	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire), Behavioral task
Walocha, Tomaszewska & Mizia, 2013⁶⁰	Empathy level differences between Polish surgeons and physicians	Poland	Empathy	Epstein Emotional Empathy Scale; Thematic Apperception Test (TAT) by Murray	Physicians	92	56.5% non-surgical; 43.5% surgical	--	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire), Behavioral task

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Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Wasserman et al., 1983 ¹¹⁷	Responsiveness to maternal concern in preventive child health visits: an analysis of clinician-parent interactions	United States	Empathy	Resource Exchange Analysis (REA)	Residents, pediatric nurses	11 (interactions)	100% pediatrics	--	Quantitative	Correlation/association study: Analytical cross-sectional	Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
West et al., 2006 ⁹¹	Association of perceived medical errors with resident distress and empathy: a prospective longitudinal study	United States	Empathy	IRI	Residents	184	100% internal medicine	84%	Quantitative	Non-randomized exposure: Cohort study	Self-report (questionnaire)
West et al., 2007 ⁶⁹	A prospective study of the relationship between medical knowledge and professionalism among internal medicine residents	United States	Empathy, Empathic concern (EC)	IRI	Residents	T1=87, T1 & T2= 55	NR	92% - 58%	Quantitative	Non-randomized exposure: Cohort study	Self-report (questionnaire), Academic knowledge assessment
Wohlgemuth, Auerbach & Parker, 2015 ¹³⁵	Advantages and challenges: the experience of geriatrics health care providers as family caregivers	United States	Empathy	--	Physicians, nurses, social workers	16	18.8% physicians	--	Qualitative	Qualitative description/thematic analysis	Interviews

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Wolfshohl et al., 2019 ⁴⁸	Association between empathy and burnout among emergency medicine physicians	United States	Empathy	JSE	Physicians, Residents	68	100% emergency medicine	92-94%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)
Woolf et al., 2007 ¹³²	'It gives you an understanding you can't get from any book.' The relationship between medical students' and doctors' personal illness experiences and their performance: a qualitative and quantitative study	United Kingdom	Empathy	--	Physicians	40	--	--	Qualitative	Qualitative description/thematic analysis	Interviews
Yuguero et al., 2017 ¹²⁴	Association between low empathy and high burnout among primary care physicians and nurses in Lleida, Spain	Spain (Catalan)	Empathy	JSPE	Physicians, nurses	267	GPs 50.9%	53%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

Table 2: Included studies

PREDICTORS OF PHYSICIAN COMPASSION: A SYSTEMATIC REVIEW

Author(s) and Year	Title	Country	Main constructs	Construct measurement	Sample - units of analysis	Sample size	Specialty	Response rate (%)	Methodology	Research Design	Data Type
Zandbelt et al., 2007 ⁶¹	Determinants of physicians' patient-centered behaviour in the medical specialist encounter	The Netherlands	Patient-centered behavior	Patient-centered Behaviour Coding Instrument (Zandbelt et al., 2005)	Physicians, Residents	30	mixed: general internal medicine 50%, rheumatology 17%, gastroenterology 33%	81%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire), Assessed by coders (e.g. (video- or audio recorded) interview assessed by coders)
Zenasni et al., 2012 ⁸²	Development of a French-language version of the Jefferson Scale of Physician Empathy and association with practice characteristics and burnout in a sample of general practitioners	France	Compassionate care (CC), Empathy	JSPE	Physicians	308	100% family medicine	67%	Quantitative	Correlation/association study: Analytical cross-sectional	Self-report (questionnaire)

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