

Table 1: Summary of findings

Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment		
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment	
PHYSICIAN (articles =133, quantitative =87, qualitative=39, mixed methods=7)	Socio-demographic factors (N=75, quantitative=57, qualitative=14, mixed methods=4)						
	Gender (N=50, quantitative=46, qualitative*=1, mixed methods^=3): females seem to be more likely to be compassionate/empathetic; although the evidence is weak as there is similar number of studies showing no gender effect at all	Females (N=25: Dehning et al., 2014 ; Zandbelt et al., 2007 ; Zenasni et al., 2012 ; Hojat et al., 2002b ; Bateman et al., 2017* ; Julia-Sanchis et al., 2019 ; Kozeny & Tisanska, 2013 ; Gleichgerrcht & Decety, 2013 ; Wasserman et al., 1983 ; Kliszcz et al., 2006 (<i>only empathetic concern</i>); Bertakis, 2011 ; Suh et al., 2012 ; Cyrus et al., 2017 ; Alcorta-Garza et al., 2016 ; Chaitoff et al., 2017 ; Shariat, Eshtad & Ansari, 2010 ; Pollak et al., 2007 ; Park et al., 2016 ; Paasche-Orlow & Roter, 2003 ; Psyhojos, 2017 ; Cicekci et al., 2017 ; Bratek et al., 2015 ; Katsari et al., 2020 ; Bylund & Makoul, 2002 ; Roberts et al., 2011) ^{41, 43, 45, 47, 49, 52, 55, 58, 61, 64, 81-83, 92, 94, 95, 99, 101, 103, 108, 113-117} , males (N=3: Jiao et al., 2014 ; Foo et al., 2017 ; Moralles et al., 2016) ^{53, 111, 112}			No gender effect (N=23: Moriarty et al., 2020 ; Charles et al., 2018 ; Clara et al., 2006 ; Shanafelt et al., 2005 ; Ferreira, Afons & Ramos, 2020 ; Osim et al., 2019 ; Kondo et al., 2013 ; Kobayasi et al., 2018 [^] ; Kliszcz et al., 2006 ; Borracci et al., 2015 ; McFarland & Roth, 2017 ; Wolfshohl et al., 2019 ; Hojat et al., 2002a ; Petrahai & Nwangwu, 2003 ; Jin et al., 2020 ; Saguem et al., 2020 ; Carmel & Glick, 1996 ; Lee et al., 2018 ; Di Lillo et al., 2009 ; Walocha, Tomaszewska & Mizia, 2013 ; Silvester et al., 2007 ; Street, Gordon & Haidet, 2007 ; Brady, Bambury & O'Reilly, 2015) ^{39, 48, 50, 51, 54, 60, 72, 74, 76-80, 84, 86, 96, 105, 106, 116, 118-121}	Moderate confidence	Due to moderate concerns about methodological limitations and moderate concerns about coherence
	Age (N=29, all quantitative): the evidence regarding the impact of age on ECRCs is conflicting and inconclusive, higher quality studies indicate either positive older age effect or no effect	Older age (N=8: Charles et al., 2018 ; Clara et al., 2006 ; Julia-Sanchis et al., 2019 (<i>only affective empathy</i>); Osim et al., 2019 ; Handford et al., 2013 ; Ferreira, Afons & Ramos, 2020 ; Shariat, Eshtad & Ansari, 2010 (<i>correlation</i>); Walocha, Tomaszewska & Mizia, 2013) ^{39-41, 47, 51, 60, 84, 86} , younger age (N=5: Julia-Sanchis et al., 2019 (<i>only cognitive empathy</i>); Kondo et al., 2013 ; Carmel & Glick, 1996 ; Silvester et al., 2007 ; Pollak et al., 2007 ; Bratek et al., 2015) ^{41, 49, 50, 54, 58, 120}			No age effect (N=15: Moriarty et al., 2020 ; Zenasni et al., 2012 ; Shanafelt et al., 2005 ; Kozeny & Tisanska, 2013 ; Chaitoff et al., 2017 ; Shariat, Eshtad & Ansari, 2010 (<i>regression</i>); Psyhojos, 2017 ; Avasarala, Whitehouse & Drake, 2015 ; Cicekci et al., 2017 ; Katsari et al., 2020 ; Komisar & McFarland, 2017 ; Yuguro et al., 2017 ; Jin et al., 2020 ; Lee et al., 2018 ; Street, Gordon & Haidet, 2007) ^{43, 47, 55, 72, 77, 80, 82, 95, 99, 106, 108, 121-124} or unclear (N=2: Zandbelt et al., 2007 ; Petrahai & Nwangwu, 2003) ^{61, 74}	Low confidence	Due to serious concerns about methodological limitations and coherence, and moderate concerns about relevance

Green - low or medium risk of bias/Blue - not enough information/ Black - high RoB

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	<p>Ethnicity/race/culture (N=13, quantitative=10, qualitative*=3): ethnicity/race does not seem to be a factor clearly affecting physician ECRCs; however cultural understanding (or even possibly how the scales are read and completed) may be indicative of the perceived differences</p>	<p>White as compared to Asian/Pacific Islanders and other ethnicities (N=1: Foo et al., 2017)¹¹², Spanish physicians as compared to Latin American physicians (N=1: Alcorta-Garza et al., 2016)⁹⁴, US physicians as compared to Czech physicians (N=1: Kozeny & Tisanska, 2013)⁵⁵, empathy is facilitated when physicians have knowledge of the patients culture (N=1: Kirmayer, 2008*)¹²⁶, local graduates (N=1: Carmel & Glick, 1996)⁵⁰</p>	<p>Physicians of "diverse background" (N=1: Haider, Riaz & Gill, 2020*)¹²⁷, certain cultural beliefs/norms preventing sharing emotion and matching emotion (N=1: Epstein & Borrelli, 2001*)¹²⁵, physicians on the South of the US are less empathetic than in the West (N=1: Psychojos, 2017)¹⁰⁸</p>	<p>There were no differences between White and Black/African American and Black/African American and Asian (Pacific Islanders) & Other ethnicities (N=1: Foo et al., 2017)¹¹², no effect of ethnicity/race or country of origin (N=6: Chaitoff et al., 2017; Pollak et al., 2007; Psychojos, 2017; Lee et al., 2018; Street, Gordon & Haidet, 2007; Carmel & Glick, 1996)^{50, 58, 72, 99, 108, 121}, physicians' year of immigration to the country they are practicing in (Israel) (N=1: Carmel & Glick, 1996)⁵⁰, physicians in the North and East of US compared to other regions and to themselves (N=1: Psychojos, 2017)¹⁰⁸ or unclear (N=1: Petrahai & Nwangwu, 2003)⁷⁴</p>	<p>Low confidence</p>	<p>Due to serious concerns about methodological limitations and coherence, and moderate concerns about relevance</p>
	<p>Religion, spirituality, and spiritual practice (e.g., meditation, reflection, prayer) (N=5: quantitative=2, qualitative*=3): as indicated mostly by qualitative studies - spirituality may positively associate with ECRCs; there is insufficient evidence with regards to religion</p>	<p>Spirituality and spiritual practice (N= 3: Uygur, Brown & Herbert, 2019*; Chou, Kellom & Shea, 2014*; Anandarajah & Roseman, 2014*)^{89, 131, 136}, meaning (Anandarajah & Roseman, 2014*)¹³⁶, religiosity (N=1: Pawlikowski, Sak & Marczewski, 2012)¹³⁷</p>	<p>Religion (N=1: Clara et al., 2006)¹³⁷</p>	<p>Moderate confidence</p>		

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		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
	Marital status (N=12, all quantitative): being married does not seem to associate with better or worse levels of empathy	Being married (N=3: Park et al., 2016; Katsari et al., 2020; Cyrus et al., 2017) ^{43, 64, 83}		No effect (N=8: Osim et al., 2019; Shanafelt et al., 2005; Saguem et al., 2020; Shariat, Eshtad & Ansari, 2010; Hong et al., 2011; Carmel & Glick, 1996; Lee et al., 2018; Bratek et al., 2015) ^{47, 49, 50, 63, 72, 76, 77, 86} or unclear (N=1: Ferreira, Afons & Ramos, 2020) ⁸⁴	Low confidence	Due to serious concerns about relevance and moderate concerns about methodological limitations
	Children (N=14, quantitative=11, qualitative*=3): it is inconclusive whether having children influences ECRCs, it is unlikely that having children can affect ECRCs negatively (except during residency)	Having children (N=5: Bateman et al., 2017*; Gottenborg et al., 2018*; Batley et al., 2016*; Julia-Sanchis et al., 2019 (<i>affective empathy only</i>); Park et al., 2016) ^{41, 64, 113, 138, 139} , number of children (N=1: Fulop et al., 2011) ¹⁴⁰	Having children (N=2: Foo et al., 2017; Moralle et al., 2016 (<i>both studies - residents sample</i>)) ^{111, 112}	Having children (N=4: Shanafelt et al., 2005; Clara et al., 2006; Julia-Sanchis et al., 2019 (<i>cognitive empathy</i>); Bratek et al., 2015) ^{39, 41, 49, 77} , number of children (N=2: Zenasni et al., 2012; Lee et al., 2018) ^{72, 82} or unclear (N=1: Ferreira, Afons & Ramos, 2020) ⁸⁴	Low confidence	Due to serious concerns about relevance and coherence, and moderate concerns about methodological limitations
	Upbringing (N=3: quantitative=1; qualitative*=2) upbringing may influence how compassionate the physician is, however, the direction will most likely depend on the type of upbringing	Depending on the type of upbringing it can have either positive or negative influence on compassion (N=2: Uygur, Brown & Herbert, 2019*; Bateman et al., 2017*; Stratta, Riding & Baker, 2016) ^{98, 113, 131}		Having relatives who are healthcare professionals (N=1: Clara et al., 2006) ³⁹	Low confidence	Due to serious concerns about data adequacy, and moderate concerns about coherence

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	Siblings (N=2; both quantitative): there is insufficient evidence to make conclusions about sibling's effect on ECRCs	Having 2 or more siblings (N=1: Park et al., 2016) ⁶⁴		Sibling rank (N=1: Saguem et al., 2020) ⁷⁶ , being an only child (N=1: Saguem et al., 2020) ⁷⁶	Very low confidence	Due to serious concerns in all domains
	Living situation (N=4, all quantitative): there is insufficient evidence to make conclusions about living situation effect on ECRCs	Living with extended family (N=1: Kataoka et al., 2012) ⁴² , living as a couple (N=1: Zenasni et al., 2012) ⁸²		Living extended family/elderly (N=1: Clara et al., 2006) ³⁹ , employment of domestic help (N=1: Lee et al., 2018) ⁷²	Low confidence	Due to serious concerns about methodological limitations and coherence, and moderate concerns about data adequacy
	Past illness (of self or relative/child/colleague) and caregiving experience (N=13: quantitative=4, qualitative*=6, mixed-methods^=3): it is likely that personal illness experience, relatives or own children illness experience, and caregiving experience associates with greater ECRCs; however, detachment can also happen to avoid being upset - countertransference is likely	Personal illness experience (N= 7: Uygur, Brown & Herbert, 2019*; Fox et al., 2009*; Jaye & Wilson, 2003*; Brady, Bambury & O'Reilly, 2015^; Roberts et al., 2011^; Woolf et al., 2007*; Pensek & Selic, 2018) ^{45, 78, 128-132} , relative/own child illness experience (N=5: Bateman et al., 2017*; Roberts et al., 2011^; Woolf et al., 2007*; Batton et al., 2011^; Krenek & Zalewski, 1993) ^{45, 113, 132-134} , caregiving experience (N=4: Uygur, Brown & Herbert, 2019*; Bateman et al., 2017*; Wohlgemuth, Auerbach & Parker, 2015*; Roberts et al., 2011^) ^{45, 113, 131, 135}	Personal/relative illness experience and countertransference, which leads to detachment (N=2: Fox et al., 2009*; Woolf et al., 2007*) ^{128, 132} , colleagues' experience of being infected at work (N=1: Pardeshi et al., 2017) ⁸⁸	Own experience with psychotherapy (N=1: Zenasni et al., 2012) ⁸²	Moderate confidence	Due to serious concerns about methodological limitations, coherence, and data adequacy

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	Quality of life (N=45, quantitative=22, qualitative=20, mixed methods=3)					
	Overall quality of life (N=2: quantitative)	Quality of Life (N=1: Katsari et al., 2020) ⁴³		Quality of Life (N=1: Kemper et al., 2020) ¹⁵⁸	Very low confidence	Due to serious concerns in all domains
	Private life and relationships (N=8: quantitative=1, qualitative*=7): it is likely that good personal relationships and social support associate with ECRCs positively, while problems in personal life - negatively	Social support (N=2: Derksen et al., 2016* (supportive family); Saguem et al., 2020 (greater number of people to provide support)) ^{76, 149} , good relationships (N=2: Swendiman et al., 2019* (with family and friends); Saguem et al., 2020 (with mother)) ^{76, 90} , being free from private worries (N=1: Derksen et al., 2015*) ⁸⁷	Current personal issues (N=4: Branch et al., 2017*; Derksen et al., 2015* (negative feelings based on issues from the past), Derksen et al., 2018*; Uygur, Brown & Herbert, 2019* (marital issues)) ^{87, 131, 146, 148} , loss of social interactions outside work (N=1: Peng, Clarkin & Doja, 2018*) ¹⁴⁵	Satisfaction with social support (N=1: Saguem et al., 2020) ⁷⁶ , good relationships with father (N=1: Saguem et al., 2020) ⁷⁶	Moderate confidence	Due to moderate concerns about data adequacy and relevance
	Work-related quality of life (N=8: quantitative=3, qualitative*=5): satisfaction with work and work-life balance/integration may associate with increased ECRCs; however, there might be different aspects of satisfaction work which might be at play that will affect ECRCs differently.	Satisfaction with work (N=5: Charles et al., 2018 (intellectual stimulation, physician-patient relationships, interactions with colleagues); Picard et al., 2016*; Derksen et al., 2015*; Carmel & Glick, 1996; Gleichgerrcht & Decety, 2013 (compassion satisfaction)) ^{50-52, 87, 93} , work-life balance/integration (N=3: Swendiman et al., 2019*; Mills, Wand & Fraser, 2018*; Chou, Kellom & Shea, 2014*) ^{89, 90, 155}		Satisfaction with work in the domains of economic profit and prestige (N=1: Charles et al., 2018) ⁵¹	Moderate confidence	Due to moderate concerns about methodological limitations and coherence

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	<p>Leisure activities (N=6: quantitative=2, qualitative*= 4) such as spending time with friends and family, time alone, taking holidays, travelling, and exercise; exposure to art, music, nature, literature, and other cultures. Having more leisure activities may be associated with greater ECRCs.</p>	<p>Leisure activities (N=4: Ahrweiler et al., 2014*; Uygur, Brown & Herbert, 2019*; Chou, Kellom & Shea, 2014*; Anandarajah & Roseman, 2014*)^{89, 131, 136, 153}, time off before medical school (N=1: Moralle et al., 2016)¹¹¹</p>		<p>Leisure activities (N=1: McManus et al., 2011)¹⁶⁶</p>	<p>Moderate confidence</p>	<p>Due to moderate concerns about coherence and data adequacy</p>
	<p>Self-care (N=4, quantitative=1, qualitative*=3): self-care might be helpful in maintaining ECRCs, but the evidence is scarce, and self-care is not well-defined</p>	<p>Self-care (N=2: Mills, Wand & Fraser, 2018*; Anandarajah & Roseman, 2014* (<i>spiritual self-care such as mindfulness, reflection, breathing</i>)^{136, 155} and personal counseling (N=1: Derksen et al., 2016*)¹⁴⁹</p>	<p>Lack of time for spiritual practice (N=1: Anandarajah & Roseman, 2014*)¹³⁶</p>	<p>Weekend off (N=1: Kemper et al., 2020)¹⁵⁸</p>	<p>Moderate confidence</p>	<p>Due to moderate concerns about coherence, data adequacy, and relevance</p>
	<p>Current physical health (N=15: quantitative=4, qualitative*=9, mixed methods^=2): feeling exhausted and tired might associate with lower levels of ECRCs</p>	<p>Good subjective physical health (level of fitness, general health, sleep, diet) (N=3: Derksen et al., 2015*; Uygur, Brown & Herbert, 2019*; Mahoney, Sladek & Neild, 2016^)^{87, 107, 131}, current physical health problems (N=1: Roberts et al., 2011 (<i>only for females</i>))⁴⁵</p>	<p>Poor personal physical health (exhaustion/tiredness/fatigue/lack of energy/reduced physical fitness) (N=7: Derksen et al., 2015*; 2016*; 2018* (<i>same sample</i>); Picard et al., 2016*; Ahrweiler et al., 2014*; Peng, Clarkin & Doja, 2018*; Porthé et al., 2018*; Bayne et al., 2013*; Mahoney, Sladek & Neild, 2016^)^{38, 87, 93, 107, 145, 146, 149, 153, 159}</p>	<p>Problems with sleep (N=3: Rosen et al., 2006; Kemper et al., 2020; Passalacqua, 2011)^{68, 158, 163}</p>	<p>Moderate confidence</p>	<p>Due to moderate concerns in all domains</p>

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	Current mental health (N=2, all quantitative): there is insufficient evidence whether one's mental health associates with ECRC	Mental wellbeing (N=1: Shanafelt et al., 2005) ⁷⁷		Anxiety (N=1: Carmel & Glick, 1996) ⁵⁰	Low confidence	Due to serious concerns about methodological limitations, coherence, and data adequacy
	Financial (N=2, quantitative=1, qualitative*=1) there is insufficient evidence whether one's financial circumstances associate with ECRCs		Financial worries (N=1: Uygur, Brown & Herbert, 2019 *) ¹³¹	Student debt (N=1: Shanafelt et al., 2005) ⁷⁷	Very low confidence	Due to serious concerns about coherence and data adequacy
	Burnout and burnout subscales (N=23, quantitative=17, qualitative*=5, mixed methods^=1): burnout negatively affects ECRCs, the evidence with relation to subscales is conflicting	Personal accomplishment (N=6: Yuguero et al., 2017; Reed et al., 2018; Park et al., 2016; Walocha et al., 2013; Fulop et al., 2011; Zenasni et al., 2012) ^{64, 75, 82, 124, 140, 165} , emotional exhaustion (N=2: Carmel & Glick, 1996; Julia-Sanchis et al., 2019 (<i>affective empathy correlation</i>)) ^{41, 50} , depersonalization (N=1: Julia-Sanchis et al., 2019 (<i>affective empathy correlation</i>)) ⁴¹	Burnout (N=13: Kealy et al., 2016 ; Branch et al., 2017 *; Gilligan et al., 2019 *; Picard et al., 2016 *; Rawal, Strahlendorf & Nimmon, 2020 *; Ferreira, Afons & Ramos, 2020 ; Kemper et al., 2020 ; Passalacqua, 2011 ; Hayuni et al., 2019 ; Lyness, 1993 *; Salysers et al., 2015 ^; Yuguero et al., 2017 ; Walocha et al., 2013) ^{65, 84, 93, 124, 147, 148, 158, 160-165} and secondary traumatic stress (N=1: Hayuni et al., 2019) ¹⁶¹ , depersonalization (N= 8: Zenasni et al., 2012 ; Reed et al., 2018 ; Park et al., 2016 ; Lown, Shin & Jones, 2019 ; Yuguero et al., 2017 ; Walocha et al., 2013 ; Fulop et al., 2011 ; Salysers et al., 2015 ^) ^{57, 64, 75, 82, 124, 140, 164, 165} , emotional exhaustion (N=4: Reed et al., 2018 ; Park et al., 2016 ; Walocha et al., 2013 ; Lown, Shin & Jones, 2019) ^{57, 64, 75, 165} , personal accomplishment (N=1: Julia-Sanchis et al., 2019 (<i>affective empathy correlation</i>)) ⁴¹	Burnout (N=2: Gleichgerrcht & Decety, 2013 ; McManus et al., 2011) ^{52, 166} , emotional exhaustion (N=6: Zenasni et al., 2012 ; Gleichgerrcht & Decety, 2013 ; Yuguero et al., 2017 ; Salysers et al., 2015 ^; Fulop et al., 2011 ; Julia-Sanchis et al., 2019 (<i>cognitive empathy correlation</i>)) ^{41, 52, 82, 124, 140, 164} , personal accomplishment (N=5: Gleichgerrcht & Decety, 2013 ; Salysers et al., 2015 ^; Carmel & Glick, 1996 ; Lown, Shin & Jones, 2019 ; Julia-Sanchis et al., 2019 (<i>cognitive empathy correlation</i>)) ^{41, 50, 52, 57, 164} , depersonalization (N=3: Gleichgerrcht & Decety, 2013 ; Julia-Sanchis et al., 2019 (<i>cognitive empathy correlation</i>); Carmel & Glick, 1996) ^{41, 50, 52}	Moderate confidence	Due to moderate concerns about relevance and methodological limitations; there were serious methodological limitations regarding burnout subscales

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	<p>Compassion fatigue (N=5: quantitative=1, qualitative*=4): there is insufficient evidence to conclude what role does compassion fatigue plays in ECRCs, it is also not clear whether compassion fatigue arises from the use of compassion or from something else (e.g., listening to problems, stress)</p>	<p>Compassion fatigue (N=1: Gleichgerrcht & Decety, 2013)⁵²</p>	<p>Compassion fatigue (N=2: Rawal, Strahlendorf & Nimmon, 2020*; Bessen et al., 2019*)^{65, 154}, fatigue from listening to problems (N=1: Picard et al., 2016*)⁹³, becoming too distressed from patients stories (N=1: Roze des Ordons et al., 2020*)¹⁶⁷</p>		<p>Low confidence</p>	<p>Due to serious concerns about coherence and moderate concerns about methodological limitations and data adequacy</p>
	<p>Stress (N=7: quantitative=2, qualitative*=5): qualitative data suggests that stress may associate negatively with ECRCs</p>	<p>Stress (N=1: Saguem et al., 2020)⁷⁶</p>	<p>Stress (N=6: Uygur, Brown & Herbert, 2019*; Roze des Ordons et al., 2020*; Branch et al., 2017; Gilligan et al., 2019*; Kemper et al., 2020; Stratta, Riding & Baker, 2016*)^{98, 131, 148, 158, 160, 167}</p>	<p>Stress (N=1: Reed et al., 2018)⁷⁵</p>		

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		Dispositional features (N=63, quantitative=29, qualitative=33, mixed methods=2)				
	<p>Personality/traits (N=30: quantitative=22, qualitative*=8): it is likely that pro-social traits and ability to deal with and recognize one's emotions positively associate with ECRCs, whereas higher emotionality and idealism associate with ECRCs negatively</p>	<p>Empathic (N=4: Picard et al., 2016*; Shariat, Eshtad & Ansari, 2010; Kliszcz et al., 2006; Hojat et al., 2005)^{47, 93, 116, 141} or compassionate personality (N=1: Gleichgerrcht & Decety, 2013*)⁵², altruism (N=1: Greenberg et al., 2015)⁷⁰, humanistic attributes (N=1: Mangione et al., 2002)⁷³, perspective taking ability (N=3: Saguem et al., 2020, Greenberg et al., 2015, Zenasni et al., 2012)^{70, 76, 82} and ability to stand in patient's shoes (N=1: Zenasni et al., 2012)⁸², interpersonal ease (N=1: Bayne et al., 2013*)³⁸, extraversion (N=1: Handford et al., 2013)⁴⁰, socio-emotional personality (N=1: Pollak et al., 2007)⁵⁸, emotional comfort (N=1: Uygur, Brown & Herbert, 2019*)¹³¹, emotional intelligence (N=1: Kliszcz et al., 2006)¹¹⁶, emotional expression ability (N=1: Scott, 2011)¹⁴⁴, psychological capital (N=1: Jin et al., 2020)¹⁰⁶, interoceptive abilities (N=1: Muslin & Schlessinger, 1971*)¹⁴³, resilience (N=2: Reed et al., 2018; Rawal, Strahlendorf & Nimmon, 2020*)^{65, 75}, persistence (N=1: Hong et al., 2011)⁶³, rationality (N=1: Scott, 2011)¹⁴⁴, confidence in providing compassionate care (N=1: Kemper et al., 2020)¹⁵⁸, self-esteem (N=2: Carmel & Glick, 1996; Scott, 2011)^{50, 144}, humility (N=1: Chou, Kellom & Shea, 2014*)⁸⁹, humbleness (N=1: Chou, Kellom & Shea, 2014*)⁸⁹, cooperativeness (N=1: Hong et al., 2011)⁶³, agreeableness (N=1: Greenberg et al., 2015)⁷⁰, interpersonal sensitivity (N=1: Scott, 2011)¹⁴⁴, like to be thanked (N=1: Picard et al., 2016)⁹³, curiosity (N=1: Chou, Kellom & Shea, 2014*)⁸⁹, willingness to learn (N=1: Chou, Kellom & Shea, 2014*)⁸⁹, fantasy ability</p>	<p>Alexithymia (N=1: Gleichgerrcht & Decety, 2013)⁵², lack of awareness for being empathetic (N=1: Haider, Riaz & Gill, 2020*)¹²⁷, authoritarianism (N=1: Bayne et al., 2013*)³⁸, utilitarian moral judgement (N=1: Santamaria-Garcia et al., 2017)⁴⁶, idealism (N=1: Peng, Clarkin & Doja, 2018*)¹⁴⁵, high achiever (N=1: Peng, Clarkin & Doja, 2018*)¹⁴⁵, technical personality (N=1: Pollak et al., 2007)⁵⁸, high emotionality (N=1: Picard et al., 2016*)⁹³</p>	<p>Ability to stand in patient's shoes (N=1: Greenberg et al., 2015)⁷⁰, extraversion (N=1: Greenberg et al., 2015)⁷⁰, openness (N=1: Greenberg et al., 2015)⁷⁰, flexibility (N=1: Scott, 2011)¹⁴⁴, emotional stability (N=1: Greenberg et al., 2015)⁷⁰, emotion regulation (N=2: Saguem et al., 2020, Scott, 2011)^{76, 144}, neuroticism (N=1: Handford et al., 2013)⁴⁰, self-perception (consultant, advisor, friend, protector) (N=1: Scott, 2011)¹⁴⁴, confidence (N=1: Pollak et al., 2007)⁵⁸, resilience (N=3: McFarland & Roth, 2017)¹⁰⁵, conscientiousness (N=1: Greenberg et al., 2015)⁷⁰, self-directedness (N=1: Hong et al., 2011)⁶³, generalized self-efficacy (N=1: Saguem et al., 2020)⁷⁶, sense of power (N=1: Greenberg et al., 2015)⁷⁰, reward dependence (N=1: Hong et al., 2011)⁶³, harm avoidance (N=1: Hong et al., 2011)⁶³, novelty seeking (N=1: Hong et al., 2011)⁶³, self-transcendence (N=1: Hong et al., 2011)⁶³, increased interest in technology (N=1: McFarland, Malone & Roth, 2017)¹⁰⁴.</p>	<p>Low confidence</p>	<p>Due to serious concerns about coherence and moderate concerns about methodological limitations and relevance</p>

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		(N=1: Saguem et al., 2020) ⁷⁶ , high perceived control over patient outcomes (N=1: Silvester et al., 2007) ¹²⁰ , difficulty engaging in goals when upset (N=1 Saguem et al., 2020) ⁷⁶ .				
	Values (N=10: all qualitative*): having empathy and compassion as a value may associate with increased ECRCs	Empathy (N=2: Lyness, 1993*; Stratta, Riding & Baker, 2016*) ^{98, 147} , compassion (N=1: Uygur, Brown & Herbert, 2019*) ¹³¹ , humanistic values (N=2: Branch et al., 2017*; Chou, Kellom & Shea, 2014*) ^{89, 148} , equality (N=1: Derksen et al., 2016*) ¹⁴⁹ , flexibility in assessment and treatment of patients based on individual and situational factors (N=1: Bayne et al., 2013*) ³⁸	Objectivity, professionalism (N=1: Derksen et al., 2016*) ¹⁴⁹		Moderate confidence	Due to moderate concerns about coherence, data adequacy, and relevance
	Attitudes (N=11: quantitative=4, qualitative*=7): positive or non-judgmental attitudes and respect might associate with greater ECRCs, prejudice and negative judgement might associate with lower ECRCs	Being respectful (N=2: Derksen et al., 2015*; Chou, Kellom & Shea, 2014* (of patient's needs)) ^{87, 89} , positive judgement (N=2: Batley et al., 2016* (non-judgmental attitude); Stratta, Riding & Baker, 2016* (positive value judgement of patients and their illness)) ^{98, 138} , "you never know" attitude (N=1: Batley et al., 2016*) ¹³⁸ , maintaining a professional and ethical attitude (N=1: Batley et al., 2016*) ¹³⁸ , negative attitude towards cynicism (N=1: Batley et al., 2016*) ¹³⁸ , patient-as-person approach (N=1: Derksen et al., 2016*) ¹⁴⁹ , being genuine (N=1: Derksen et al., 2015*) ⁸⁷ , prosocial attitudes (N=1: Carmel & Glick, 1996) ⁵⁰	Prejudice and negative value judgement of patients and their illness (N=3: Derksen et al., 2018*; Stratta, Riding & Baker, 2016*; Moriarty et al., 2020 (negative attitudes towards self-harm)) ^{80, 98, 146} , low trust (N=1: Psychojos, 2017) ¹⁰⁸ , focusing on physical discomfort (N=1: Lin, Hsu & Chong, 2008*) ¹⁵⁷	Patient-centered attitude (N=1: Zandbelt et al., 2007) ⁶¹	Moderate confidence	Due to moderate concerns about data adequacy and relevance

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* - qualitative study

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Table 1: Summary of findings

Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
	<p>Beliefs/motivations/understanding (N=18: quantitative=2, qualitative*=14, mixed methods^=2): positive beliefs about the importance of compassion/empathy in medical care (professional responsibility, outcomes), and motivation to maintain good standards of care and to get more job satisfaction from practicing compassion may positively associate with ECRCs; on a contrary, beliefs that compassion/empathy may negatively affect objectivity, mental health, or does not substitute an "action" may hinder ECRCs. The quality of evidence regarding negative contribution of negative beliefs is poorer.</p>	<p>Belief that compassion/empathy are a part of medical care/professional responsibility (N=5: Aomatsu et al., 2013*; Uygur, Brown & Herbert, 2019*; Swendiman et al., 2019*; Lyness, 1993*; Carmel & Glick, 1996)^{90, 90, 131, 142, 147} and motivation to maintain the good standards of care (N=3: Chou, Kellom & Shea, 2014*, Swendiman et al., 2019*, Derksen et al., 2016*)^{89, 90, 149}, belief that compassion/empathy provide positive contribution to medical care (efficiency, therapy adherence, receiving useful and detailed information, a better interpretation of complaints, improved diagnostics, connection with patients) (N=4: Uygur, Brown & Herbert, 2019*; Chou, Kellom & Shea, 2014*; Derksen et al., 2015*; Bayne et al., 2013*)^{38, 87, 89, 131}, understanding that difficult patients may be acting out of fear (N=2: Aomatsu et al., 2013*; Batley et al., 2016*)^{138, 142}, motivation to have more satisfaction/energy/joy from work by practicing compassion (N=3: Uygur, Brown & Herbert, 2019*; Chou, Kellom & Shea, 2014*; Branch et al., 2017*)^{89, 131, 148}, urge towards service (N=1: Anandarajah & Roseman, 2014*)¹³⁶, motivation to pass on values - being a role model (N=1: Branch et al., 2017*)¹⁴⁸, trying to understand empathy cognitively (N=2: Aomatsu et al., 2013*; Bayne et al., 2013*)^{38, 142}</p>	<p>Belief that empathy negatively affects objectivity (N=4: Stratta, Riding & Baker, 2016*; Lyness, 1993*; Mahoney, Sladek & Neild, 2016*; Ross & Indart, 2017*)^{98, 107, 147, 150}, belief that being too empathetic can threaten own mental health (N=1: Stratta, Riding & Baker, 2016*)⁹⁸, belief that patients' views often unrealistic, emotive, influenced by bias (N=1: Mahoney, Sladek & Neild, 2016*)¹⁰⁷, belief that empathy does not solve medical problems (N=1: Lyness, 1993*)¹⁴⁷, in the context of incurable illness - hard to accept that just being there, not contributing anything specifically medical to the encounter (N=1: Pinder, 1992*)¹⁵², motivation to please colleagues (N=1: Peng, Clarkin & Doja, 2018*)¹⁴⁵, trying to understand empathy emotionally (N=1: Bayne et al., 2013*)³⁸</p>	<p>Belief that 'doctors' mode of communication differs radically from 'normal' communication... motivation for psychiatric training (N=1: Saguem et al., 2020)⁷⁶</p>	<p>Moderate confidence</p>	<p>Due to moderate concerns about data adequacy</p>

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Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
	<p>Feelings/emotions (N=16: quantitative=5, qualitative*=1): ECRC may be hindered by fear of overidentification, feelings of uncertainty and associated with it anxiety, and feelings of isolation</p>	<p>Distress (N=2: Jin et al., 2020; Saguem et al., 2020)^{76, 106}, feeling privilege and humility to work with people who are vulnerable (N=1: Swendiman et al., 2019*)⁹⁰</p>	<p>Fear of becoming too emotionally involved/overidentifying (N=3: Derksen et al., 2016*; Batley et al., 2016*; Bayne et al., 2013*)^{38, 138, 149}, anxiety and feelings of uncertainty (N=2: Baker et al., 2018*; Pinder, 1992*)^{151, 152}, feelings of isolation (N=2: Anandarajah & Roseman, 2014*; Peng, Clarkin & Doja, 2018*)^{136, 145}, emotional difficulty with EOL (N=1: Bessen et al., 2019*)¹⁵⁴, grief (N=1: Peng, Clarkin & Doja, 2018*)¹⁴⁵, fear of judgement or criticism (N=1: Bayne et al., 2013*)³⁸, being afraid to ask open-ended questions (N=1: Bishop et al., 2014*)¹⁶⁸, fear of contagion (N=1: Battegay et al., 1991*)¹⁸²</p>	<p>Grief (N=1: Hayuni et al., 2019)¹⁶¹, mood or emotional state (N=1: Pensek & Selic, 2018)¹³⁰, distress (N=1: Komisar & McFarland, 2017 (unclear))¹²³</p>	<p>Moderate confidence</p>	<p>Due to moderate concerns about methodological limitations, coherence, and data adequacy</p>

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Table 1: Summary of findings

	<p>Coping mechanisms and facilitative behaviors (N=31: quantitative*=5, qualitative*=25, mixed methods^=1): it is evident that reflective practices such as personal or group reflection and mindfulness, and exploring emotions are likely to positively associate with ECRCs, additionally practicing compassion will likely increase future compassion. Doubting or criticizing oneself, on a contrary, will likely associate with ECRC negatively; lack of positive coping strategies and defense mechanisms such as detachment, avoidance, hiding emotions will likely result in lower ECRC</p>	<p>Self- or group reflection/reflexivity (N=8: Derksen et al., 2015*; Chou, Kellom & Shea, 2014*; Swendiman et al., 2019*; Davidsen & Fosgerau, 2014*; Ahrweiler et al., 2014*; Woolf et al., 2007*; Pinder, 1992*; Stratta, Riding & Baker, 2016*)^{87, 89, 90, 98, 100, 132, 152, 153}, self-awareness (N=5: Uygur, Brown & Herbert, 2019*; Derksen et al., 2015*; Bessen et al., 2019*; Stratta, Riding & Baker, 2016*; Muslin & Schlessinger, 1971*)^{87, 98, 131, 143, 154}, mindfulness (N=2: Branch et al., 2017*; Reed et al., 2018)^{75, 148}, a habit of connecting with patients (N=2: Chou, Kellom & Shea, 2014*; Swendiman et al., 2019*)^{89, 90}, practicing and getting inspiration from compassion/empathy (that leads to inspiration and more compassion) (N=2: Uygur, Brown & Herbert, 2019*; Bayne et al., 2013*)^{38, 131}, humor (N=2: Mahoney, Sladek & Neild; 2016^, Stratta, Riding & Baker, 2016*)^{98, 107}, having realistic expectations (N=1: Swendiman et al., 2019*)⁹⁰, talking about/exploration of doubts and emotions (N=2: Derksen et al., 2015*; Davidsen & Fosgerau, 2014*)^{87, 100}, imagining self or family going through the same experience (N=1: Branch et al., 2017*)¹⁴⁸, finding meaning in working with dying patients (N=1: Komisar & McFarland , 2017)¹²³, not focusing on achievement (N=1: Swendiman et al., 2019*)⁹⁰, self-control (N=1: Scott, 2011)¹⁴⁴, setting limits on schedules/negotiating control (N=1: Chou, Kellom & Shea, 2014*)⁸⁹</p>	<p>Self-criticism (N=1: Mills, Wand & Fraser, 2018*)¹⁵⁵, self-doubt (N=1: Lyness, 1993*)¹⁴⁷, self-stigma for being inadequate (N=1: Peng, Clarkin & Doja, 2018*)¹⁴⁵, overidentification with the patient (N=2: Picard et al., 2016*; Bessen et al., 2019*)^{93, 154}, self-protection (N=1: Picard et al., 2016*)⁹³, trying to find balance (N=2: Picard et al., 2016*; Batley et al., 2016*)^{93, 138}, restricting amount of empathy (N=1: Batley et al., 2016*)¹³⁸, detachment/setting boundaries (N=6: Batley et al., 2016*; Lin, Hsu & Chong, 2008*; Bayne et al., 2013*; Derksen et al., 2016*; Mahoney, Sladek & Neild, 2016*; Woolf et al., 2007)^{38, 107, 132, 138, 149, 157}, avoidance of certain conversations, situations/hiding emotional vulnerability (changing subject, token empathy) (N= 4: Crowe & Brugha, 2018*; Davidsen & Fosgerau, 2014*; Lin, Hsu & Chong, 2008*; Bessen et al., 2019*)^{100, 154, 156, 157}, objectification (N=1: Picard et al., 2016*)⁹³, rationalizing (N=1: Davidsen & Fosgerau, 2014*)¹⁰⁰, habituation (N=3: Aomatsu et al., 2013*; Picard et al., 2016*; Stratta, Riding & Baker, 2016*)^{93, 98, 142}, humor (N=2: Mahoney, Sladek & Neild, 2016^; Stratta, Riding & Baker, 2016*)^{98, 107}, loss of interest (N=1: Picard et al., 2016*)⁹³, lack of coping strategy/ poor coping mechanisms (N=2: Picard et al., 2016*; Rawal, Strahlendorf & Nimmon, 2020*)^{65, 93}, lack of reflection (N=2: Lin, Hsu & Chong, 2008*; Haider, Riaz & Gill, 2020*)^{127, 157}, lack of self-awareness/attention to extend compassion (N=1: Roze des Ordonns et al., 2020*)¹⁶⁷, quasi-Stockholm Syndrome, where residents downplay, excuse, or even support the negative aspects of being a resident all while their quality of life suffers (hardship as desirable part of training) (N=1: Peng, Clarkin & Doja, 2018*)¹⁴⁵</p>	<p>Self-compassion (N=2: Kemper et al., 2020; Reed et al., 2018)^{75, 158}, mindfulness (N=1: Reed et al., 2018)⁷⁵, alcohol use (N=1: Lee et al., 2018)⁷²</p>	<p>Moderate confidence</p>	<p>Due to moderate concerns in all domains</p>
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Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
		Professional factors (N=86, quantitative=72, qualitative=11, mixed methods=3)				
	<p>Specialties/satisfaction with career (N=39, quantitative=33, qualitative*=3, mixed methods^=3): it is possible that physicians in patient-centered/relational specialties are more compassionate/empathetic than in specialties that are technology-orientated, although the evidence with regards to particular specialties is mixed, and there is a high number of studies showing that specialty is not a significant factor</p>	<p>Patient-centered specialties/physicians with relational interest in the job (N=4: Hojat et al., 2002b; Picard et al., 2016*; Park et al., 2016; Kataoka et al., 2012)^{42, 64, 92, 93}, mental health physicians/psychiatrists (N=4: Chaitoff et al., 2017; Roberts et al., 2011^; Hojat et al., 2002a; Khajavi & Hekmat, 1971; Santamaria-Garcia et al., 2017)^{45, 46, 71, 96, 99}, GPs/family medicine (N=3: Davidsen & Fosgerau, 2014; Sandikci et al., 2017; Bertakis, 2011)¹⁰⁰⁻¹⁰², internal medicine (N=3: Cicekci et al., 2017; Suh et al., 2012; Carmel & Glick, 1996)^{50, 81, 95}, pediatrics (N=2: Chaitoff et al., 2017, Carmel & Glick, 1996)^{50, 99}, obstetrics-gynecology (N=2: Chaitoff et al., 2017; Cyrus et al., 2017)^{83, 99}, dermatology (N=1: Suh et al., 2012)⁸¹, rehabilitation physicians (N=1: Suh et al., 2012)⁸¹, surgery (N=1: Chaitoff et al., 2017 (<i>thoracic</i>))⁹⁹, non-hospital specialties (N=1: Alcorta-Garza et al., 2016)⁹⁴, non-surgical specialties (N=1: Walocha et al., 2013)⁶⁰, physicians satisfied with their career choice (N=1: Kemper et al., 2020)¹⁵⁸</p>	<p>Technology-centered specialties (N=3: Hojat et al., 2002b; Kataoka et al., 2012; Park et al., 2016)^{42, 64, 92}, surgical (N=7: Khajavi & Hekmat, 1971; Stanton et al., 2011; Stratta, Riding & Baker, 2016*; Hojat et al., 2002a; Walocha et al., 2013; Alcorta-Garza et al., 2016; Cicekci et al., 2017)^{60, 71, 94-98}, radiology (N=2: Suh et al., 2012; Hojat et al., 2002a)^{81, 96}, anesthesiology (N=2: Cicekci et al., 2017; Hojat et al., 2002a)^{95, 96}, internal medicine (N=4: Chaitoff et al., 2017; Paasche-Orlow & Roter, 2003; Cyrus et al., 2017; Bertakis, 2011)^{83, 99, 101, 103}, GPs/family medicine (N=3: Suh et al., 2012; Santamaria-Garcia et al., 2017; Roberts et al., 2011^)^{45, 46, 81}, psychiatry (N=1: Davidsen & Fosgerau, 2014*)¹⁰⁰, obstetrics-gynecology (N=1: Hojat et al., 2002a)⁹⁶, emergency medicine (N=1: Cyrus et al., 2017)⁸³, hematology-oncology rotations (N=2: McFarland & Roth, 2017 (<i>only for females</i>); McFarland, Malone & Roth, 2017 (<i>IRI total</i>))^{104, 105}</p>	<p>Not specialty effect (N=6: Zandbelt et al., 2007; Kondo et al., 2013; Psyhojos, 2017; Jin et al., 2020; Mahoney, Sladek & Neild, 2016^; Brady, Bambury & O'Reilly, 2015^)^{54, 61, 78, 106-108}, medical vs surgical specialty (N=4: Lee et al., 2018; Di Lillo et al., 2009; Foo et al., 2017; Moralle et al., 2016)^{72, 79, 111, 112}, surgery (N=1: Cicekci et al., 2017)⁹⁵, primary vs non primary care (N=1: Avasarala, Whitehouse & Drake, 2015)¹²², GPs/family medicine (N=1: Hojat et al., 2002a)⁹⁶, correctional vs non-correctional (N=1: Dhawan, Steinbach & Halpern, 2007)¹⁰⁹, mental health professionals vs non-mental health professional (N=1: Gatheshill, Kucharska-Pietura & Wattis, 2011 (<i>empathy towards patients with mental disorders</i>))¹¹⁰, emergency medicine (N=3: Cicekci et al., 2017; Kataoka et al., 2012; Hojat et al., 2002a)^{42, 95, 96}, internal medicine (N=1: Hojat et al., 2002a)⁹⁶, pediatrics (N=1: Hojat et al., 2002a)⁹⁶, pulmonology (N=1: Cicekci et al., 2017)⁹⁵, rehabilitation medicine (N=1: Kataoka et al., 2012)⁴², ophthalmology (N=1: Foo et al., 2017)¹¹², hematology-oncology rotations (N=2: McFarland & Roth, 2017 (<i>only for males</i>); McFarland, Malone & Roth, 2017 (<i>empathic concern</i>))^{104, 105}, public health (N=1: Kataoka et al., 2012)⁴², satisfaction with career choice/vocational engagement (N=1: McManus et al., 2011)¹⁶⁶, job prestige (N=2: Charles et al., 2018; Carmel & Glick, 1996)^{50, 51}.</p>	<p>Low confidence</p>	<p>Due to serious concerns about methodological limitations and coherence</p>

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Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
	<p>Professional stage and experience (N=64, quantitative=53, qualitative*=8, mixed methods^=3): experience is likely to associate positively with ECRCs; although the evidence is weak as there is similar number of studies showing no experience effect at all; it is not clear whether ECRC increases or decreases during residency</p>	<p>Experience (N=11: Clara et al., 2006; Bayne et al., 2013*; Handford et al., 2013 Julia-Sanchis et al., 2019 (cognitive empathy); Paul-Savoie et al., 2018; Kataoka et al., 2012; Shariat, Eshtad & Ansari, 2010; Wolfshohl et al., 2019; Santamaria-Garcia et al., 2017 (in the context of dealing with intentional self-harm); Roberts et al., 2011^; Katsari et al., 2020 (duration of employment in current post)³⁸⁻⁴⁸, professional status/seniority (in-training, attending, chief) (N=5: Osim et al., 2019; Ferreira, Afons & Ramos, 2020; Khajavi & Hekmat, 1971; Jing, Jin & Liu, 2019; Cyrus et al., 2017)^{71, 83-86}, increase during residency (N=4: Rawal, Strahlendorf & Nimmon, 2020*; Hong et al., 2011; Park et al., 2016 (only for people-oriented specialties); Foreback et al., 2018)⁶²⁻⁶⁵</p>	<p>Experience (N=1: Julia-Sanchis et al., 2019 (affective empathy))⁴¹, decline during residency (N=5: Wolfshohl et al., 2019; West et al., 2007, Foreback et al., 2018; Rosen et al., 2006; Bellini & Shea, 2005 (empathetic concern); Bellini, Baime & Shea, 2002 (empathetic concern))^{48, 66-69}, decline during 3 month (mid to end year) during residency (N=1: Reed et al., 2018)⁷⁵, professional status/seniority (in-training, attending, chief) (N=1: Alcorta-Garza et al., 2016)⁸⁴</p>	<p>Year level during residency (N=11: Shanafelt et al., 2005; Khajavi & Hekmat, 1971; Reed et al., 2018; Lee et al., 2018; Park et al., 2016; Greenberg et al., 2015; Roberts et al., 2011^; Foreback et al., 2018; Mangione et al., 2002; Saguem et al., 2020; Petrahai & Nwangwu, 2003)^{45, 62, 64, 70-77}, experience (N=13: Charles et al., 2018; Zandbelt et al., 2007; Kondo et al., 2013; Gleichgerricht & Decety, 2013; Lelorain et al., 2013; Jiao et al., 2014; Kozeny & Tisanska, 2013; Bratek et al., 2015; Pollak et al., 2007; Lown, Shin & Jones, 2019; Putrino et al., 2018; Carmel & Glick, 1996; Walocha, Tomaszewska & Mizia, 2013)⁴⁹⁻⁶¹, professional status/seniority (in-training, attending, chief) (N=10: Moriarty et al., 2020; Clara et al., 2006; Zandbelt et al., 2007; Zenasni et al., 2012; Jiao et al., 2014; Suh et al., 2012; Di Lillo et al., 2009; Carmel & Glick, 1996; Brady, Bambury & O'Reilly, 2015^)^{39, 50, 53, 61, 78-82}</p>	<p>Low confidence</p>	<p>Due to serious concerns about coherence and moderate concerns about methodological limitations and relevance</p>
	<p>Training/competency (N=22: quantitative=17, qualitative*=5, mixed methods^=1): professional training and competency are likely to positively associate with ECRC, while lack of professional competency and training would produce an opposite result</p>	<p>Empathy knowledge (N=1: Picard et al., 2016*)⁹³, professional training (e.g. youth mental health, infectious disease, consultation skills) (N=3: Derksen et al., 2015*; Moriarty et al., 2020; Pardeshi et al., 2017)^{80, 87, 88}, professional competency (N=3: Bayne et al., 2013*; Julia-Sanchis et al., 2019 (cognitive empathy); Jing, Jin & Liu, 2019)^{38, 41, 85}, longer mean duration of formal education (N=1: Jiao et al., 2014)⁵³, having a Master's degree (N=1: Saguem et al., 2020)⁷⁶, osteopathic (DO)/non-MD training (N=2: Lebowitz & Ahn, 2014; Chaitoff et al., 2017)^{99, 189}, analytically trained psychiatrists > behaviorally trained psychiatrists (N=1: Dehning et al., 2014)¹¹⁵</p>	<p>Lack of special training/skills (EOL conversations, applying compassion) (N=2: Roze des Ordonns et al., 2020*, Bessen et al., 2019*)^{154, 167}, professional competency (N=1: Julia-Sanchis et al., 2019 (affective empathy))⁴¹, medical education (MD) (N=2: Lebowitz & Ahn, 2014; Mahoney, Sladek & Neild, 2016^)^{107, 189}</p>	<p>Type of degree (BA/MA/technical) (N=1: Jiao et al., 2014)⁵³, MD/DO degree (N=1: Psyhojos, 2017)¹⁰⁸, medical school (N=1: Carmel & Glick, 1996)⁵⁰, bioethical education (N=1: Clara et al., 2006)³⁹, medical knowledge (N=1: West et al., 2007)⁶⁹, past communication training (N=1: Pollak et al., 2007)⁵⁸, self-reported need for communication training (Zandbelt et al., 2007)⁶¹</p>	<p>Low confidence</p>	<p>Due to serious concerns about coherence and moderate concerns about methodological limitations</p>

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		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
	<p>Extra-professional activity (N=11: quantitative=8, qualitative*=2, mixed methods^=1): having an extra-professional activity is possibly helpful for ECRCs</p>	<p>Employment outside of clinic (not working at only one place) (N=1: Charles et al., 2018)⁵¹, lower supplementary earnings (N=1: Carmel & Glick, 1996)⁵⁰, academic role/experience teaching (N=3: Swendiman et al., 2019*; Chou, Kellom & Shea, 2014*; Carmel & Glick, 1996)^{50, 89, 90}, performing administrative duties (N=2: Osim et al., 2019, Carmel & Glick, 1996)^{50, 86}, being a Balint attendee or a supervisor (N=1: Lelorain et al., 2013)⁵⁶, reading professional literature (N=1: Carmel & Glick, 1996)⁵⁰</p>		<p>Extra-professional activity (N=1: Saguem et al., 2020)⁷⁶, academic role/ experience teaching (N=2: Carmel & Glick, 1996; Mahoney, Sladek & Neild, 2016)^{50, 107}, being a part of professional society (N=1: Zenasni et al., 2012)⁸², moonlighting habits (N=1: Shanafelt et al., 2005)⁷⁷, additional private practice (N=1: Clara et al., 2006)³⁹</p>	<p>Low confidence</p>	<p>Due to serious concerns about coherence</p>
	<p>Medical errors/litigation (N=1 quantitative): insufficient evidence</p>			<p>Past medical error (N=1: West et al., 2006)⁹¹</p>	<p>Low confidence</p>	<p>Due to serious concerns about data adequacy and relevance</p>

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		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
ENVIRONMENTAL (articles=57 , quantitative =25, qualitative=30, mixed methods=2)	Healthcare settings (N=16, quantitative=13, qualitative=2, mixed methods=1)					
	It is likely that broader settings of practice have little impact on ECRC	Outpatient (ambulatory) settings (N=2: Chaitoff et al., 2017; Santamaria-Garcia et al., 2017) ^{46, 99} , urban settings (N=2: Yuguero et al., 2017) ¹²⁴ , working at ED (N=1: Julia-Sanchis et al., 2019) ⁴¹ , working at a hospital/location of graduation (N=1: Carmel & Glick, 1996) ⁵⁰	Acute settings (surgery/ED) (N=2: Batley et al., 2016* ^{98, 138} ; Stratta, Riding & Baker, 2016*) ^{98, 138} , rural settings (N=1: Yuguero et al., 2017) ¹²⁴ , pre-hospital medical services (N=1: Julia-Sanchis et al., 2019) ⁴¹	Workplace (hospital/office/clinic; current rotation (outpatient; hospital; ICU; research)) (N=5: Shanafelt et al., 2005; Julia-Sanchis et al., 2019; Kemper et al., 2020; Shariat, Eshtad & Ansari, 2010; Carmel & Glick, 1996) ^{41, 47, 50, 77, 158} , private vs public (N=4: Kozeny & Tisanska, 2013; Mahoney, Sladek & Neild, 2016^; Shariat, Eshtad & Ansari, 2010; Carmel & Glick, 1996) ^{47, 50, 55, 107} , urban vs rural (N=3: Charles et al., 2018; Mahoney, Sladek & Neild, 2016^; Shariat, Eshtad & Ansari, 2010) ^{47, 51, 107} , district hospital vs tertiary psychiatric (N=1: Jiao et al., 2014) ⁵³ , practice type (partnership/non partnership) (N=1: Charles et al., 2018) ⁵¹ , hospital (N=1: Di Lillo et al., 2009) ⁷⁹ , correctional/non-correctional (N=1: Dhawan, Steinbach & Halpern, 2007) ¹⁰⁹	Low confidence	Due to serious concerns about methodological limitations and moderate concerns about coherence and relevance
	Organizational settings (N=45, quantitative=15, qualitative=29)					
General working conditions rating (N=2, quantitative=1, mixed methods^=1): limited evidence to make conclusion	Positive (N=1: Mahoney, Sladek & Neild, 2016^) ¹⁰⁷	Negative (N=1: Mahoney, Sladek & Neild, 2016^) ¹⁰⁷	Unconducive work environment for providing empathetic care (N=1: McFarland, Malone & Roth, 2017) ¹⁰⁴	Very low confidence	Due to serious concerns about methodological limitations, data adequacy, and relevance, and moderate concerns about coherence	

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Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
	<p>Organizational structure (N=5, all qualitative*): it is possible that hierarchical environments are not conducive of ECRCs, although the evidence is small; we cannot make conclusions about the practice size as observations in two studies are based on the same sample</p>	<p>Lower number of registered patients/smaller practice size without loss of income (N=1 (same sample): Derksen et al., 2015*; Derksen et al., 2016*)^{87, 149}</p>	<p>Non-facilitative practice structures (N=1: Rider et al., 2018*)¹⁷⁰, hierarchical (not being respected or valued, having limited control over scheduling) (N=2: Peng, Clarkin & Doja, 2018*; Ahrweiler et al., 2014*)^{145, 153}</p>		<p>High confidence</p>	-

Green - low or medium risk of bias/Blue - not enough information/ Black - high RoB

* - qualitative study

^ - mixed methods

Table 1: Summary of findings

Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
	<p>Organizational resources (N=11: quantitative=2, qualitative*=9): organizational resources, especially continuous education and counseling, good leadership, human resources support, and physical resources, are facilitative of ECRCs</p>	<p>Continuous education and counseling (counseling services, Balint groups, activities, educational development programs sensitivity exercises, communication coaching and reflection exercises; Schwartz Center Rounds®; patient-centered retreats, supervision and intervention for GPs to help with emotions) (N=6: Derksen et al., 2016*; Ahrweiler et al., 2014*; Gilligan et al., 2019*; Chou, Kellom & Shea, 2014*; Lelorain et al., 2013; Rider et al., 2018*)^{56, 89, 149, 153, 160, 170}, good leadership (N=3: Anandarajah & Roseman, 2014*; Mills, Wand & Fraser, 2018*; Rider et al., 2018*)^{136, 155, 170}, physical recourses (e.g. office systems, access to healthy food and fitness facilities; dry cleaning pick-up, onsite oil changes and meals-to-go available from the cafeteria; comfortable staff lounge areas) (N=1: Chou, Kellom & Shea, 2014*)⁸⁹, human recourses support (pain consultants, social workers, palliative care team) (N=2: Bishop et al., 2014*; Chou, Kellom & Shea, 2014*)^{89, 168}, good learning environment, encouraging compassion or empathy in educational curriculum (N=2: Kemper et al., 2020; Stratta, Riding & Baker, 2016*)^{98, 158}, policies and vision statements (N=1: Gilligan et al., 2019*)¹⁶⁰</p>	<p>Not enough resources to help (N=1: Anandarajah & Roseman, 2014*)¹³⁶</p>		<p>High confidence</p>	-

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Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
	<p>Operational environment (N=36: quantitative=13, qualitative*=23): time constraints, bureaucracy, lack of continuity and austerity policies associate with lower ECRCs, efficient organizational practices, such as good triage, seem to increase ECRCs; the evidence regarding the amount of work or economic profit is inconclusive</p>	<p>Efficient organizational practices: good triage; a more flexible system of appointments, structured deliberations between GPs and practice assistants, understanding of interruptions timing (N=3: Derksen et al., 2015*, 2016* (same sample); Batley et al., 2016*; Pinder, 1992*)^{87, 138, 149, 152}, increased consultation length (N=2: Derksen et al., 2015*, 2016* (same sample); Lelorain et al., 2013)^{56, 87, 149}, no time pressure (N=1: Derksen et al., 2015*)⁸⁷, rewarding empathy by measuring empathy (N=1: Derksen et al., 2015*)⁸⁷, work variability (N=1: Swendiman et al., 2019*)⁹⁰, monetary incentives (N=1: Jing, Jin & Liu, 2019)⁸⁵</p>	<p>Time constraints/pressures/overloaded work schedules and less time spend with patient (N=18: Uygur, Brown & Herbert, 2019*; Ahrweiler et al., 2014*; Roze des Ordonns et al., 2020*; Rawal, Strahlendorf & Nimmon, 2020*; Peng, Clarkin & Doja, 2018*; Branch et al., 2017*; Bayne et al., 2013*; Lin, Hsu & Chong, 2008*; Haider, Riaz & Gill, 2020*; Mills, Wand & Fraser, 2018*; Bishop et al., 2014*; Derksen et al., 2018*; Porthe et al., 2018*; Kerasidou, 2019*; Bessen et al., 2019*; Stratta, Riding & Baker, 2016*; Rider et al., 2018*; Lown, Shin & Jones, 2019)^{38, 57, 65, 98, 127, 131, 145, 146, 148, 153-155, 157, 159, 167-170}, workload (N=7: Derksen et al., 2016*, 2018* (same sample), Picard et al., 2016*; Haider, Riaz & Gill, 2020*; Ahrweiler et al., 2014*; Roze des Ordonns et al., 2020*; Lyness, 1993*; Putrino et al., 2018)^{59, 93, 127, 146, 147, 149, 153, 167}, patient load (N=6: Derksen et al., 2016*, Bayne et al., 2013*, Lin, Hsu & Chong, 2008*, Stratta, Riding & Baker, 2016*, Sandikci et al., 2017; Putrino et al., 2018)^{38, 59, 98, 102, 149, 157}, long working hours (N=1: Peng, Clarkin & Doja, 2018*)¹⁴⁵, bureaucracy/red tape (excessive administrative processes or rules, new protocols, checklists, patient-distant tasks) (N=7: Derksen et al., 2016*, 2018* (same sample), Kerasidou & Kingori, 2019*, Kerasidou, 2019* (same sample), Peng, Clarkin & Doja, 2018*; Branch et al., 2017*; Bayne et al., 2013*; Ahrweiler et al., 2014*; Rider et al., 2018*)^{38, 127, 145, 146, 148, 149, 153, 169-171}, lack of continuity with one patient, fragmentation (lots of different clinicians involved) (N=2: Bishop et al., 2014*, Roze des Ordonns et al., 2020*)^{167, 168}, targets/unrealistic objectives, and obsessive management monitoring (N=2: Haider, Riaz & Gill, 2020*, Kerasidou, 2019*)^{127, 169}, austerity</p>	<p>Patient load (N=4: Zenasni et al., 2012, Zandbelt et al., 2007, Ferreira, Afons & Ramos, 2020, Passalacqua, 2011)^{61, 82, 84, 163}, workload (N=1: Zandbelt et al., 2007)⁶¹, length of consultation (N=2: Zandbelt et al., 2007; Zenasni et al., 2012)^{61, 82}, economic profit (N=2: Charles et al., 2018; Carmel & Glick, 1996)^{50, 51}, short length of patient stay (N=1: McFarland, Malone & Roth, 2017)¹⁰⁴, being able to do a patient sign-out (N=1: Lases et al., 2019)¹⁷², visit sequence (N=1: Zandbelt et al., 2007)⁶¹, average available time (follow-up consult) (N=1: Zandbelt et al., 2007)⁶¹</p>	High confidence	-

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Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
			<p>policies/cuts (N=2: Porthé et al., 2018*, Kerasidou, 2019*^{159, 169}, (N=2), low remuneration (N=2: Peng, Clarkin & Doja, 2018*; Derksen et al., 2016*)^{145, 149}, compensation decisions rules (N=1: Branch et al., 2017*)¹⁴⁸, "being the doormat of the health insurance companies", the attitude of health financiers (N=1: Derksen et al., 2015*, 2016* (same sample))^{87, 149}, invisibility of certain type of work (compassion, EOL conversations)/ emphasis on measuring the quality of care by the figures of a protocol that does not include the importance of empathy as a quality indicator (N=2: Derksen et al., 2015*; Bessen et al., 2019*)^{87, 154}, priority towards aggressive curative treatments (N=1; Bishop et al., 2014*)¹⁶⁸, doing someone else's job (wrong fit of diagnoses to specialization/department) (N=1: Batley et al., 2016*)¹³⁸</p>			
	<p>Proximal (clinical) environment (N=12: quantitative=3, qualitative*=9): stressful clinical environment (busyness, interruptions) is not conducive of ECRCs</p>	<p>(Stressful) clinical environment in general (N=2: Roze des Ordonns et al., 2020*; Picard et al., 2016*)^{93, 167}, phone calls (N=2: Branch et al., 2017*; Derksen et al., 2015*, 2016* (same sample))^{87, 148, 149}, full waiting rooms (N=1: Derksen et al., 2016*, 2018* (same sample))^{146, 149}, exposure to challenging situations/ high-pressure scenarios and life threatening medical conditions (N=2: Peng, Clarkin & Doja, 2018*, Bayne et al., 2013*)^{38, 145}, busy environment/sense of urgency (N=1: Batley et al., 2016*)¹³⁸, interruptions by assistants (N=1: Derksen et al., 2015*)⁸⁷, recent night shift (N=1: Derksen et al., 2016*)¹⁴⁹, involvement with call-services (being on-call more often) (N=1: Clara et al., 2006)³⁹, long call shifts (N=1: Passalacqua, 2011)¹⁶³</p>	<p>Presence of 3rd person (relative) in clinical interaction (N=1: Zandbelt et al., 2007)⁶¹</p>	<p>Moderate confidence</p>	<p>Due to moderate concerns about data adequacy</p>	

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Table 1: Summary of findings

Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
		Collegial climate (N=19, quantitative=6, qualitative=13)				
	Positive role models and collegial support associate with greater ECRCs, lack of support and unprofessional superiors will hinder ECRCs	<p>Role models: positive (N= 7: Ahrweiler et al., 2014*; Anandarajah & Roseman, 2014*; Gilligan et al., 2019*; Mills, Wand & Fraser, 2018*; Swendiman et al., 2019*; Stratta, Riding & Baker, 2016*; Rider et al., 2018*)^{90, 98, 136, 153, 155, 160, 170} and negative (N=1: Swendiman et al., 2019*)⁹⁰, good (relationships with) colleagues (N=4: Derksen et al., 2016*; Chou, Kellom & Shea, 2014*; Swendiman et al., 2019*; Charles et al., 2018)^{51, 89, 90, 149}, peer support (N=2: Ahrweiler et al., 2014*; Bessen et al., 2019*)^{153, 154}, informal teaching/mentoring (N=1: Gilligan et al., 2019*)¹⁶⁰</p>	<p>Negative role models/lack of physician role models that were responsive to patient emotions (N=2: Ahrweiler et al., 2014*; Lyness, 1993*)^{147, 153}, lack of support in general/feeling alone (N=3: Peng, Clarkin & Doja, 2018*; Anandarajah & Roseman, 2014*; Lown, Shin & Jones, 2019)^{57, 136, 145}, unprofessional superiors/non-supportive leadership/lack of respect from supervisors (N=2: Peng, Clarkin & Doja, 2018*; Rider et al., 2018*)^{145, 170}, challenging colleagues/colleagues do not treat each other with compassion (N=2: Peng, Clarkin & Doja, 2018*; Branch et al., 2017*)^{145, 148}</p>	<p>Teamwork/supportiveness/satisfaction with relationships with colleagues (N=3: Lases et al., 2019, Carmel & Glick, 1996, Passalacqua, 2011)^{50, 163, 172}, feeling unsupported, mistreatment (N=1: McFarland, Malone & Roth, 2017)¹⁰⁴, educational atmosphere: role of specialty tutor, coaching and assessment, work adapted to competence, accessibility supervisors (N=1: Lases et al., 2019)¹⁷²</p>	Moderate confidence	Due to moderate concerns about methodological limitations, coherence, and data adequacy

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Table 1: Summary of findings

Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
		Organizational culture and values (N=21, qualitative=20, mixed methods=1)				
	Supportive organizational culture is likely to affect ECRCs positively, efficiency-driven, disease-centered, evidence-based/guideline driven healthcare with emphasis on business is likely to hinder ECRCs. Additionally, hidden curriculum and emphasizing intelligence and excellence values in medical education are not conducive of compassionate care.	<p>Culture (supportive, cooperative, collaborative) (N=5: Ahrweiler et al., 2014*; Anandarajah & Roseman, 2014*; Mills, Wand & Fraser, 2018*; Bessen et al., 2019*; Rider et al., 2018*)^{136, 153-155, 170}, compassion recognition by organization, nurturing empathy, compassion and emotional intelligence in staff (N=1: Gilligan et al., 2019*)¹⁶⁰, value placed on physicians as human beings (organizational) (N=1: Anandarajah & Roseman, 2014*)¹³⁶</p>	<p>Organizational culture and values (that inhibits humanism) (N=3: Roze des Ordonns et al., 2020*; Rawal, Strahlendorf & Nimmon, 2020*; Rider et al., 2018*)^{65, 167, 170}, efficiency/operationalization of healthcare (N=4: Anandarajah & Roseman, 2014*; Peng, Clarkin & Doja, 2018*; Bishop et al., 2014*; Kerasidou & Kingori, 2019* and Kerasidou, 2019* (same sample))^{136, 145, 168, 169, 171}), disease-centered emphasis/ seeing people as diagnoses/culture of focusing on the medico-scientific abstraction instead of the patient/favoring clinical knowledge over patient communication skills/detachment culture (N=5: Ahrweiler et al., 2014*; Peng, Clarkin & Doja, 2018*; Derksen et al., 2016*; Bayne et al., 2013*; Crowe & Brugha, 2018*)^{38, 145, 149, 153, 156}, evidence-based practice/guideline-driven care (therapeutic regimens and 'programmed asking' from evidence-based guidelines and protocols)/ managed care: strict medical guidelines and standardized treatments (N=4: Derksen et al., 2015*, 2016* (same sample); Baker et al., 2018*; Bayne et al., 2013*; Kerasidou & Kingori, 2019*)^{38, 87, 149, 151, 171}, business values/commercialization of medical practice (N=3: Branch et al., 2017*; Bayne et al., 2013*; Haider, Riaz & Gill, 2020*)^{38, 127, 148}, hidden curriculum: language, patient judgements, avoiding talking to patient so there are less things to do/less obligations (N=3: Rawal, Strahlendorf & Nimmon, 2020*, Branch et al., 2017*, Stratta, Riding & Baker, 2016*)^{65, 98, 148}, "broken system"/training (loss of empathy) (N=2: Peng, Clarkin & Doja, 2018*; Brady, Bambury & O'Reilly, 2015*)^{78, 145}, detail-oriented</p>		Moderate confidence	Due to moderate concerns about data adequacy and relevance

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Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
			<p>culture/technical tasks priority (N=2: Anandarajah & Roseman, 2014*; Bishop et al., 2014*)^{136, 168}, busy-ness culture (N=2: Anandarajah & Roseman, 2014*; Mills, Wand & Fraser, 2018*)^{136, 155}, intelligence and excellence values (medical education) (N=2: Bayne et al., 2013*; Haider, Riaz & Gill, 2020*)^{38, 127}, culture of patient safety from the perspective of professional liability (N=1: Baker et al., 2018*)¹⁵¹, standardized treatment culture (restrictions on reimbursements and prescriptions) (N=1: Bayne et al., 2013*)³⁸, values of being emotionally tough (N=1: Crowe & Brugha, 2018*)¹⁵⁶, unsupportive culture (N=1: Mills, Wand & Fraser, 2018*)¹⁵⁵</p>			
PATIENT AND FAMILY	Relational factors (N=19, quantitative=9, qualitative=10)					
	<p>(articles=37, quantitative=19, qualitative=17, mixed methods=2)</p> <p>Connection/interaction (N=13: quantitative=6, qualitative*=7): a presence of personal "click" and easy, open communication are likely to positively associate with ECRC; communication difficulties are likely to negatively associate with ECRC</p>	<p>Connection/"click" (N=2: Uygur, Brown & Herbert, 2019*; Derksen et al., 2015*, 2018* (same sample))^{87, 131, 146}</p>	<p>Lack of reciprocal interaction/ not being able to "click" (N=1: Derksen et al., 2016*, 2018* (same sample))^{146, 149}, difficulty in communication (i.e. immigrants, intellectual disability - language difference, more explanations/paperwork) (N=5: Roze des Ordon et al., 2020*, Porthé et al., 2018*; Bayne et al., 2013*; Street, Gordon & Haidet, 2007; Meeuwesen et al., 2006)^{38, 121, 159, 167, 174}, lack of trust and openness (caused by, for instance, liability issues) (N=1: Derksen et al., 2018*)¹⁴⁶, more variability than stability in physician patient-centered behavior per patient (N=1: Zandbelt et al., 2007)⁶¹</p>	<p>Length of relationships with the doctor/familiarity (N=3: Zandbelt et al., 2007; Pollak et al., 2010; Bylund & Makoul, 2005)^{61, 179, 184}, general satisfaction with relationships with patients (N=1: Carmel & Glick, 1996)⁵⁰, emotional intensity of interaction (N=1: Bylund & Makoul, 2005)^{61, 179, 184}</p>	High confidence	-

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Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
	<p>Patient-doctor similarity (N=8: quantitative=4, qualitative*=4): there is conflicting evidence of doctor-patient perceived similarity effect</p>	<p>Doctor's perceived similarity of the patient to self or a close contact/relative (N=1: Bayne et al., 2013*)³⁸, gender concordance (N=1: Wasserman et al., 1983)¹¹⁷, female gender concordance (N=1: Bertakis & Azari, 2012)¹⁷⁸, doctor's understanding of the patient culture (N=1: Kirmayer, 2008*)¹²⁶</p>	<p>Doctor's perceived similarity of the patient to self or a close contact/relative (N=2: Picard et al., 2016*, Bessen et al., 2019*)^{93, 154}</p>	<p>Gender (N=2: Street, Gordon & Haidet, 2007; Bertakis, 2011 and Bertakis & Azari, 2012 (<i>same sample</i>), Bertakis & Azari, 2012(<i>male gender</i>))^{101, 121, 178}, age (N=1: Street, Gordon & Haidet, 2007)¹²¹ or race concordance (N=1: Street, Gordon & Haidet, 2007)¹²¹</p>	<p>Low confidence</p>	<p>Due to serious concerns about methodological limitations, coherence, and data adequacy</p>
	Patient factors (N=30, quantitative=17, qualitative=13)					
	<p>Patient socio-demographic factors (N=14: quantitative=10, qualitative*=4): there is a possibility of positive bias in providing compassionate care towards higher class (education/income) patients, or vulnerable populations (highly disadvantaged, elderly, children); there is a possibility of negative bias in providing compassionate care towards minorities (i.e. immigrants and people with language barrier) and</p>	<p>Higher educated (N=2: Bertakis, 2011 and Bertakis & Azari, 2012 (<i>same sample</i>); Batley et al., 2016*)^{101, 138, 178}, higher income/ socio economic status (N=2: Batley et al., 2016*; Bertakis & Azari, 2012)^{138, 178}, disadvantaged/impooverished (N=2: Batley et al., 2016*, Pollak et al., 2010)^{138, 179}, elderly (N=3: Zandbelt et al., 2007; Bayne et al., 2013*; Batley et al., 2016*)^{38, 61, 138}, children (N=2: Bayne et al., 2013*; Batley et al., 2016*)^{38, 138}, locals (non-immigrants) (N=1: Meeuwesen et al., 2006)¹⁷⁴, Whites (N=1: Foo et al., 2017)¹¹²</p>	<p>Different language/language barrier (N=2: Bayne et al., 2013*; Handford et al., 2013)^{38, 40}, immigrants (N=2: Porthé et al., 2018*, Meeuwesen et al., 2006)^{159, 174}, Black/African-American (N=2: Park et al., 2018 (<i>HIV context</i>); Street, Gordon & Haidet, 2007 (<i>vs White only</i>))^{121, 181}, minority (N=1: Foo et al., 2017)¹¹², "Enemy patients" (outgroup - during conflicts) (N=1: Rubinstein & Bentwich, 2017* (<i>patient who are in direct (military) conflict with the host, i.e. Palestinians/Syrians</i>))¹⁸⁰</p>	<p>Gender (N=5: Zandbelt et al., 2007; Pollak et al., 2010; Johnson Shen et al., 2019; Park et al., 2018; Bertakis, 2011 and Bertakis & Azari, 2012 (<i>same sample</i>))^{61, 101, 176, 178, 179, 181}, age (N=4: Johnson Shen et al., 2019; Park et al., 2018; Street, Gordon & Haidet, 2007; Bertakis, 2011 and Bertakis & Azari, 2012 (<i>same sample</i>))^{101, 121, 176, 178, 181}, race/ethnicity (N=3: Pollak et al., 2010; Johnson Shen et al., 2019; Street, Gordon & Haidet, 2007 (<i>Hispanic vs White</i>))^{121, 176, 179}, education (N=2: Pollak et al., 2010; Street, Gordon & Haidet, 2007)^{121, 179}, income (N=1: Bertakis, 2011)¹⁰¹, primary language (N=1: Zandbelt et al., 2007)⁶¹, marital status (N=1: Pollak et al., 2010)¹⁷⁹</p>	<p>Moderate confidence</p>	<p>Due to moderate concerns about methodological limitations, coherence, and relevance</p>

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Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
	Black/African-American patients; patients' gender, age and marital status show no effect on compassion					
	<p>Patient behavior/emotions (N=19, quantitative=8, qualitative*=11): cooperative, thankful patients are more likely to receive compassionate care, while uncooperative patients with problematic behavior (e.g. anger, aggression, entitlement), patients who cross moral boundaries (i.e. drug dealers, abusers), or patients who lack understanding and do not express emotions (worse communicators) are less likely to receive compassionate care; patients preferences, self-efficacy, or distress possibly have little effect</p>	<p>Understanding/cooperative (N=2: Porthé et al., 2018*; Batley et al., 2016*)^{138, 159}, thankful/more satisfied with care (N=2: Picard et al., 2016*; Street, Gordon & Haidet, 2007)^{93, 121}, receptive of compassion/empathy (N=2: Bayne et al., 2013*; Roze des Ordonns et al., 2020*)^{38, 167}, positive affect/ positively valenced empathic opportunities (N=2: Street, Gordon & Haidet, 2007; Bylund & Makoul, 2005)^{121, 184}, quiet and polite (N=1: Batley et al., 2016*)¹³⁸, better communicators (N=1: Street, Gordon & Haidet, 2007)¹²¹, highly concerned mothers (N=1: Wasserman et al., 1983)¹¹⁷, sad patients (N=1: Kennifer et al., 2009)¹⁷⁵, "difficult patients" (N=1: Anandarajah & Roseman, 2014*)¹³⁶, patients with more severe or moderately severe emotion (N=1: Kennifer et al., 2009)¹⁷⁵</p>	<p>Aggressive/violent (N=2: Porthé et al., 2018*; Derksen et al., 2015*, 2016* (same sample))^{87, 149, 159}, angry (N=3: Bayne et al., 2013*; Sandikci et al., 2017; Lyness, 1993*), patients who cross moral boundaries (i.e. actively engaging in sexual abuse, child abuse, or drug dealing) (N=1: Derksen et al., 2015*, 2016* (same sample))^{38, 102, 147}, demanding/nagging/entitled patients with high expectations (N=2: Porthé et al., 2018*, Batley et al., 2016*)^{138, 159}, low compliance (N=2: Baker et al., 2018*, Lyness, 1993)^{147, 151}, other behaviors such as: unpleasant or amoral behavior (N=1: Derksen et al., 2018*)¹⁴⁶, argumentative (N=1: Derksen et al., 2016*)¹⁴⁹, uncooperative (N=1: Batley et al., 2016*)¹³⁸, disrespectful (N=1: Batley et al., 2016*)¹³⁸, unthankful (N=1: Picard et al., 2016*), dissatisfied with care (N=1: Street, Gordon & Haidet, 2007)¹²¹, negatively valenced empathic opportunities (N=1: Bylund & Makoul, 2005)¹⁸⁴, high anxiety (N=1: Sandikci et al., 2017)¹⁰², fear (N=1: Kennifer et al., 2009)¹⁷⁵, less effective communicators (N=1: Street, Gordon & Haidet, 2007)¹²¹, patients who are unfamiliar with medical terminology may lack full understanding of treatment options (N=2: Bayne et al., 2013*, van Hoorn et al., 2019)^{38, 173}, emotionally distant (what do they want? difficult to read - esp. older males of "rough-diamond" type) (N=1: Derksen et al., 2016*)¹⁴⁹, patients who do not disclose lack of</p>	<p>Patient distress (N=1: Johnson Shen et al., 2019)¹⁷⁶, patient stigma (lung cancer context) (N=1: Johnson Shen et al., 2019)¹⁷⁶, self-efficacy in medical interactions (N=1: Zandbelt et al., 2007)⁶¹, preference for participation in decision making (N=1: Zandbelt et al., 2007)⁶¹, information preference (detailed/not detailed) (N=1: Zandbelt et al., 2007)⁶¹</p>	<p>Moderate confidence</p>	<p>Due to moderate concerns in all domains</p>

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		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
			understanding (N=1: Bayne et al., 2013*) ³⁸ , patients with less severe emotion (N=1: Kennifer et al., 2009) ¹⁷⁵ , legal undertone (N=1: Derksen et al., 2018*) ¹⁴⁶			
	Doctor's perception of patients' motives (N=7: quantitative=4, qualitative*=3): physician's negative perceptions of patient's motives and personality are likely to undermine ECRCs	Patient progress / likelihood of treatment adherence (N=2: Johnson Shen et al., 2019 ; Street, Gordon & Haidet, 2007) ^{121, 176}	Patients who "waste time" (e.g. taking time away from those who come in with conditions they didn't contribute to themselves, patients who are seen to have caused/ contributed to their illness) (N=2: Batley et al., 2016* ; Stein, 1986) ^{138, 177} , manipulative/ lying, patients who have other intentions (e.g. drug seeking or malingering behaviors)/ physicians' low trust in patient data (N=3: Bayne et al., 2013* ; Sandikci et al., 2017 ; Psyhojos, 2017) ^{38, 102, 108} , attention seeking (N=2: Batley et al., 2016*) ¹³⁸ , patients who exaggerate their symptoms (N=1: Batley et al., 2016*) ¹³⁸ , egoistic (N=1: Batley et al., 2016*) ¹³⁸ , "VIP" patients (those with connections with senior doctors in the institution, politicians, or the wealthy who are pulling strings and not caring for the lives of others) (N=1: Batley et al., 2016*) ¹³⁸		Low confidence	Due to serious concerns about relevance, and moderate concerns about methodological limitations, coherence, and data adequacy
	Patient family (N=2: qualitative* and quantitative): there is insufficient amount of evidence to make conclusions about the family influence, but it appears similar to that of patients' behavior	Having family members who are fun, hospitable, and appreciative (N=1: Batley et al., 2016*) ¹³⁸	Intrusive/interrogative family members with no situational awareness (N=1: Batley et al., 2016*) ¹³⁸	Closeness of the relative to the patient (N=1: Cicekci et al., 2017 (ICU context)) ⁹⁵	Low confidence	Due to serious concerns about coherence, data adequacy, and relevance, and moderate concerns about methodological limitations

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Table 1: Summary of findings

Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
		Situational factors (N=8, quantitative=6, qualitative=1, mixed methods=1)				
	The evidence in relation to situational factors is of low quality, and scarce - insufficient to make conclusions about the effect	Empathic opportunities (N=2: Epstein et al., 2007; Bylund & Makoul, 2005) ^{184, 185} , speaking to patients' relatives 5-10min (not less) (N=1: Cicekci et al., 2017 (<i>ICU context</i>)) ⁹⁵	Time consuming emotional issues/challenges during the diagnosis conversation (N=3: Johnson Shen et al., 2019; Park et al., 2018; Polonsky et al., 2014) ^{176, 181, 183} , speaking to patients' relatives less than 5min (N=1: Cicekci et al., 2017 (<i>ICU context</i>)) ⁹⁵ , patients where there is a conflict in maintaining confidentiality while protecting risk the patient or community (N=1: Battegay et al., 1991* (<i>contact tracing in HIV</i>)) ¹⁸²	Presence of 3rd person (relative) (N=1: Zandbelt et al., 2007) ⁶¹ , speaking to patients' relatives for more than 10min (N=1: Cicekci et al., 2017 (<i>ICU context</i>)) ⁹⁵ , frequency of patients' relative speaking to the physician (N=1: Cicekci et al., 2017 (<i>ICU context</i>)) ⁹⁵	Very low confidence	Due to serious concerns in all domains
		Clinical factors (N=23, quantitative=13, qualitative=10)				
CLINICAL	(articles = 23, quantitative = 13, qualitative = 10) Pain (N=5, quantitative=4, qualitative*=1): there is too little evidence to make conclusions, however, type and performance of pain might be important for ECRCs	Patients with visible pain (N=1: Paul-Savoie et al., 2018) ⁴⁴ or cancer-related pain (N=1: Roth, Burgess & Mahowald, 2007) ¹⁸⁷	Patient's "wrong" performance of pain (N=1: Baker et al., 2018*) ¹⁵¹ , patients with less visible pain signs (N=1: Paul-Savoie et al., 2018) ⁴⁴ - <i>both studies in a context of chronic pain</i>	Presence of pain (N=1: Bertakis, 2011*; Bertakis & Azari, 2012* (<i>same sample</i>)) ^{101, 178} , non-cancer pain (e.g., lower backpain) (N=1: Roth, Burgess & Mahowald, 2007) ¹⁸⁷	Very low confidence	Due to serious concerns about methodological limitations, coherence, and data adequacy, and moderate concerns about relevance

Green - low or medium risk of bias/Blue - not enough information/ Black - high RoB

* - qualitative study

^ - mixed methods

Table 1: Summary of findings

Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
	<p>Injury/illness type (N=12, quantitative=7, qualitative=5): it is difficult to make conclusions - the evidence is incoherent; broadly illness with more complex or psychosomatic symptomatology, or illness that is stigmatized seems to predict lower ECRCs</p>	<p>Accident victims (N=1: Batley et al., 2016*)¹³⁸, patients who had similar illnesses or conditions as the doctor (N=1: Fox et al., 2009*)¹²⁸</p>	<p>Patients with psychosomatic disease/psychological or social symptoms (N=2: Butalid, Bensing & Verhaak, 2014; Sandikci et al., 2017)^{102, 186}, more physical symptoms/multiple concerns (N=1: Zandbelt et al., 2007, Sandikci et al., 2017)^{51, 102}, patients who had similar illnesses or conditions as the doctor (N=1: Fox et al., 2009*)¹²⁸, chronic illness (N=1: Sandikci et al., 2017)¹⁰², patients with disgusting symptoms (difficult to focus on the patient instead of the symptom) (N=1: Muggleton, Guy & Howard, 2015*)¹⁸⁸, (predominantly) biological explanations of mental health disorders (N=1: Lebowitz & Ahn, 2014)¹⁸⁹, wrong fit of diagnoses with the department/specialization (N=1: Batley et al., 2016*)¹³⁸, patients with stigmatized condition (HIV) as it is difficult to talk about for both the physician and the patient (N=1: Battegay et al., 1991*)¹⁸², Parkinson's (incurable progressive disease) - inability to cure, gradually worsening personal and family crises, often over a long period of time, hard to accept that just being there, not contributing anything specifically medical to the encounter, was of value in itself, Parkinson's face provides one with little feedback (N=1: Pinder, 1992*)¹⁵²</p>		<p>Low confidence</p> <p>Due to serious concerns about methodological limitations and coherence, and moderate concerns about relevance</p>	
	<p>Acuity/severity (N=5: quantitative=2, qualitative*=3): non-acute patients who are getting better are less likely to receive ECRCs</p>	<p>High acuity/patient in critical state (N=2: Batley et al., 2016*, Bishop et al., 2014*)^{138, 168}</p>	<p>Non-acute patients (N=1: Batley et al., 2016*)¹³⁸, patients who are getting better (N=1: Bishop et al., 2014*)¹⁶⁸ or, on the contrary, high-pressure scenarios and life threatening medical conditions (N=1: Bayne et al., 2013*)³⁸, more severe condition (N=1: Zandbelt et al., 2007)⁶¹</p>	<p>Case difficulty (N=1: Passalacqua, 2011)¹⁶³</p>		<p>Moderate confidence</p> <p>Due to moderate concerns about coherence and data adequacy</p>

Green - low or medium risk of bias/Blue - not enough information/ Black - high RoB

* - qualitative study

^ - mixed methods

Table 1: Summary of findings

Domain description	Summary of review finding	Studies contributing to the review finding			CERQual assessment	
		Positive	Negative	No effect	CERQual assessment of confidence in the evidence	Explanation of CERQual assessment
	Terminal illness (N=3, all qualitative*): the limited evidence does not allow to make conclusions	Terminal condition/patients who will not get better (N=2: Bayne et al., 2013* ; Bishop et al., 2014*) ^{38, 168}	Palliative care/EOL (i.e., associations with death, emotionally difficult conversations, delayed referrals) (N=1: Bessen et al., 2019*) ¹⁵⁴		Low confidence	Due to serious concerns about data adequacy, and moderate concerns about methodological limitations and coherence
	Comorbidities (N=8: quantitative=6, qualitative*=2): due to low quality of evidence it is hard to make conclusions; preliminary mental illness co-morbidity and substance use may potentially affect ECRCs negatively	High patient self-reported physical health status (N=1: Bertakis, 2011 and Bertakis & Azari, 2012 (same sample)) ^{101, 178} , patients with obesity (N=1: Bertakis & Azari, 2012) ¹⁷⁸	Smokers (N=1: Bertakis, 2011 and Bertakis & Azari, 2012 (same sample)) ^{101, 178} , co-presence of drug addiction (N=1: Sandikci et al., 2017) ¹⁰² , patients who have intellectual disabilities - lack full understanding of treatment options (N=1: Bayne et al., 2013*) ³⁸ , patients with personality disorders (N=1: Derksen et al., 2016*) ¹⁴⁹ , greater symptoms of depression (N=1: van Hoorn et al., 2019) ¹⁷³	Mental health/depression, anxiety (N=1: Zandbelt et al., 2007) ⁶¹ , smoking (N=1: Johnson Shen et al., 2019 (in the context of lung cancer)) ¹⁷⁶ , high patient self-reported mental health (N=1: Bertakis, 2011 and Bertakis & Azari, 2012 (same sample)) ^{101, 178} , BMI (N=1: Bertakis, 2011) ¹⁰¹ , alcohol abuse (N=1: Bertakis, 2011 and Bertakis & Azari, 2012 (same sample)) ^{101, 178}	Low confidence	Due to serious concerns about methodological limitations, and moderate concerns about coherence and relevance
	Frequent presenters (N=3, quantitative=2, qualitative*=1) the evidence is small and inconclusive; there is a possibility that frequent presentation may affect ECRCs negatively		Frequent presenters or patients with unresolved recurring problems (N=2: Batley et al., 2016* , Sandikci et al., 2017) ^{102, 138}	Frequent presenters (N=1: Zandbelt et al., 2007) ⁶¹	Low confidence	Due to serious concerns about data adequacy, and moderate concerns about methodological limitations, coherence, and relevance

Green - low or medium risk of bias/Blue - not enough information/ Black - high RoB

* - qualitative study

^ - mixed methods

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