

REVIEW

Open Access



Empathy and compassion in the health-related literature: disciplinary and topic trends and gaps

Lynne D'Amico

Abstract

Background: The aim of this paper is to explore the disciplinary and topic trends associated with *empathy* (E) and *compassion* (C) in the PubMed health-related literature and assess whether they suggest a sufficient basis for understanding empathic and compassionate relationships and communities of care in ways that serve practical ends.

Methods: I performed 353 queries on E and C in the PubMed database, searching on E, C, and E AND C alone and with 23 disciplinary and 60 topic terms. I considered the total distribution of results for E, C, and E AND C, the relative distribution of results for E and C, and the relative distributions of results within nursing and medicine because of the importance of E and C to healthcare outcomes.

Results: The findings reveal a lack of pragmatic perspective suggested by a) semantic overlap between E and C, b) bias toward the psychological perspective of E and C, and c) lack of significant association between E and C and *language/linguistics* and *emotions* and the disciplines and topics critical to them that inform pragmatic understanding.

Conclusions: The findings point to a gap between theory and the understanding needed to serve as a sufficient basis for understanding empathic and compassionate relationships and communities of care. They suggest there is an opportunity to understand E and C in the light of communicative function where the inextricable association between language and emotion has been illuminated and the potential lies to advance scientific understanding in a way that bridges this gap.

Keywords: Empathy, Compassion, Empathic relationships, Compassionate relationships, Empathic communities, Compassionate communities

Background

Attention to *empathy* (E) and *compassion* (C) in the health-related literature is burgeoning, a trend that can be expected to continue, given the determinant role relationships have been shown to play in the clinical healthcare picture as evidenced by Del Canale et al.'s landmark study in Parma, Italy linking physician empathy and positive clinical outcome for patients with diabetes mellitus [1]; and, Kelly, Kraft-Todd, Schapira, Kossovsky, and Riess' meta-analysis of randomized control trials associating the quality of patient-clinician relationships to a statistically significant role in healthcare outcomes [2].

These studies suggest a need to look more closely at how E and C are represented in the health-related

literature since empathic and compassionate relationships and communities of care hold such great promise for reducing burden on public health.

Purpose

I performed a general review of the PubMed literature on E and C to uncover disciplinary and topic trends and gaps and assess whether they suggest empathic and compassionate relationships and communities of care are understood well enough to serve as a basis for actively shaping empathic and compassionate relationships and communities of care.

Hypothesis

I hypothesized the literature on E and C would be biased toward psychology and the objectified and reductionist

Correspondence: ldamico@knowledgeshaping.org; lynne.damico@gmail.com
Knowledge-Shaping Solutions, 1228 Prince Street, Alexandria, VA 22314, USA



perspectives associated with it that are largely based on studies of non-naturally occurring data (NND), data elicited with researcher intervention (e.g., prompts, role-plays, and surveys), and that many of the disciplinary perspectives and topics important to informing a practical understanding of E and C would be overlooked.

Methods

I performed 353 search queries in the PubMed database between February 1–5, 2018. I focused solely on PubMed because I was interested in identifying trends and gaps in the literature rather than reviewing individual publications, and regarded PubMed as a reliable representation of the health-related literature, a service of the National Library containing more than 28 million citations for biomedical literature.

I began by performing three general searches on *E*, *C*, and *E AND C*. Then, I queried *E* and *C* separately with each of the 23 disciplinary and 60 topic search terms listed in Tables 1 and 2, and in various combinations. I also queried *E* and *C* separately within the disciplines of *nursing* and *medicine* using the same search terms.

I converted query results into percentages and compared the results for queries related to *E* and *C* in Tables 1 and 2. I separately assessed results within *nursing* and *medicine* because of the importance of *E* and *C* to healthcare, as shown in Tables 3 and 4.

Results

Tables 1 and 2 display the distribution of results related to *E* and *C* in the literature.

Tables 3 and 4 show the distributions of noteworthy results specific to *E* and *C* within *nursing* and *medicine*.

Results suggest three main findings.

Finding 1: Semantic overlap between *E* and *C*

The general search on *E* returned the same number of results as the search on *E* and *C* together (21,260) although the search on *C* returned 2682 more results (23,942). When queries were performed on a topic or discipline in association with *E* and *C*, the number of results returned for *C* most often exceeded the number associated with *E*, as shown in the tables.

Table 1 Results by Discipline

Ref #	Disciplinary terms searched with E/C	# of results associated with E (N = 21,260)	% of results associated with E	# of results associated with C (N = 23,942)	% of results associated with C
1	Psychology	11,998	56	12,990	54
2	Nursing	6489	31	7962	33
3	Education	5906	28	6504	27
4	Medicine	4329	20	5052	21
5	Communication	4427	21	4718	20
6	Emotions research	2173	10	2325	10
7	Healthcare ethics	1644	8	1839	8
8	Clinical ethics	1247	6	1264	5
9	Social theory	1084	5	1134	5
10	Language	1001	5	1068	4
11	Anthropology	935	4	1046	4
12	Neuroscience	915	4	979	4
13	Epidemiology	912	4	1102	5
14	Social neuroscience	597	3	621	3
15	Neural imaging	406	2	417	2
16	Cognitive-behavioral therapy	398	2	501	2
17	Linguistics	226	1	238	1
18	Conflict management	158	1	177	1
19	Mindfulness-based cognitive-behavioral therapy	114	1	114	0
20	Social dynamics	106	0	118	0
21	Discourse analysis	70	0	78	0
22	Pragmatics	6	0	6	0
23	Sociolinguistics	0	0	0	0

Table 2 Results by Topic

Ref #	Topic terms searched with E/C	# of results associated with E (N = 21,260)	% of results associated with E	# of results associated with C (N = 23,942)	% of results associated with C
1	Psychosocial variables	12,135	57	13,151	55
2	Attitudes	5732	27	6244	26
3	Emotional E	5653	27	5653	24
4	Emotions	4195	20	4491	19
5	Thought	2225	10	2450	10
6	Cognitive E	2081	10	2018	8
7	Patient satisfaction	1136	5	1247	5
8	Interventions	981	5	1244	5
9	Lack of E/C	958	5	1107	5
10	Attitudes and emotions	944	4	1018	4
11	Scales	663	3	730	3
12	Negative emotions	621	3	621	3
13	Burnout	607	3	864	4
14	Conflict	601	3	679	3
15	Positive emotions	586	3	652	3
16	Communication and language	494	2	518	2
17	Facial expressions	479	2	486	2
18	Anger	369	2	425	2
19	Theories	359	2	387	2
20	Measuring	355	2	386	2
21	Experimental study	354	2	385	2
22	Education and interventions	344	2	416	2
23	Emotional awareness	336	2	385	2
24	Interventions and teaching	285	1	365	2
25	Connection	280	1	330	1
26	Communities	274	1	287	1
27	Compassion fatigue	267	1	553	2
27	Difficult patients	256	1	301	1
29	Patient-centered communication	241	1	257	1
30	Language and emotions	236	1	244	1
31	Physician relationships	208	1	88	0
32	Mixed methods	164	1	218	1
33	Discrimination	151	1	189	0
34	Conflict management	158	1	177	0
35	Frustration	128	1	139	0
36	Interpersonal conflict	110	1	119	0
37	Social dynamics	106	0	118	0
38	Educational interventions	100	0	118	0
39	Health disparities	80	0	93	0
40	Lack of E/C and health outcomes	52	0	68	0
41	Relationship dynamics	43	0	48	0
42	Conscious mind	42	0	44	0
43	Randomized control trials	37	0	46	0

Table 2 Results by Topic (Continued)

Ref #	Topic terms searched with E/C	# of results associated with E (N = 21,260)	% of results associated with E	# of results associated with C (N = 23,942)	% of results associated with C
44	Rumination	34	0	63	0
45	Interventions and review papers	34	0	42	0
46	Implicit bias	31	0	32	0
47	Psychosocial perspectives	28	0	32	0
48	Discrimination and lack of E/C	18	0	24	0
49	Ethnographic studies	18	0	20	0
50	Conscious decision-making	16	0	17	0
51	Resentment	15	0	19	0
52	Explicit bias	14	0	16	0
53	Compassionate communities	10	0	17	0
54	Linguistic structures	7	0	8	0
55	Self-talk	3	0	3	0
56	Interpersonal conflict and lack of E/C	2	0	3	0
57	Resistant thought	2	0	2	0
58	Ethnographic discourse analysis	2	0	2	0
59	Discrimination, negative thought, and lack of E/C	0	0	0	0
60	Relational frame theory	0	0	0	0

Finding 2: Disciplinary bias toward psychology

As shown on Table 1, most of the results associated E/C with psychology, 56%/54% respectively. The same bias emerged within *nursing* and *medicine* as shown in Tables 3 and 4.

Finding 3: Insignificant association between E and C and language/linguistics and E and C other disciplines and topics critical to pragmatic perspective

An insignificant percentage of the total results associated E/C with *language* (5%/4% respectively) or *linguistics* (1%/1% respectively).

As shown on Table 1, some of the most insignificant associations were with disciplines closely tied to language: *Social dynamics*, *mindfulness-based cognitive behavioral therapy*, *discourse analysis*, *pragmatics*, and *sociolinguistics*. Further, while most of the results linked E/C to *psychology*, when *psychology* was queried with *language* and *E/C*, it comprised only 3%/2% respectively of the results. Similarly, the queries on *psychosocial variables*, *language*, and *E/C* comprised similarly low percentages of the results even though *psychosocial variables* comprised the greatest percentage of topic results in the review (57%/55%).

As shown in Table 2, some of the most insignificant associations occurred between E/C and topics essential to a practical understanding of empathic and compassionate relationships and communities of care such as *attitudes and emotions*, *conflict*, *positive emotions*, *negative emotions*, *anger*, *emotional awareness*, *connection*,

difficult patients, *resentment*, *language and emotions*, *discrimination*, *conflict management*, *frustration*, *interpersonal conflict*, *social dynamics*, *physician relationships*, *relationship dynamics*, *rumination*, *conscious mind*, *implicit bias*, *psychosocial perspectives*, *discrimination and lack of E/C*, *resentment*, *conscious decision-making*, *explicit bias*, *linguistic structures*, *self-talk*, and *resistant thought*.

Those same insignificant topic associations persisted in results specific to *nursing* and *medicine*, shown in Tables 3 and 4.

Limitations

This review paints a broad picture of trends and gaps in the PubMed literature on E and C at the exclusion of other databases. It is not intended as a systematic review of E and C. While it admittedly reflects my biases as a linguist and non-specialist in psychology, it is intended to add diversity to the conversation on E and C at a cross-cultural level and encourage more varied research alliances for the purpose of advancing scientific understanding informing health policy.

Discussion

Finding 1 (semantic overlap) helps support the hypothesis in the light of the other findings. The numbers indicate that while C appears in the literature without E, there are no instances in the results where E appears without C. This suggests the distinction commonly made

Table 3 Results Specific to *Nursing*

Ref #	Terms searched with E/C within <i>nursing</i>	# of results associated with E (N = 6489)	% of results associated with E	# of results associated with C (N = 7962)	% of results associated with C
1	Psychology	3729	57	3980	50
2	Communication	1306	20	1383	17
3	Emotions	737	11	808	10
4	Thought	701	11	752	9
5	Attitudes and emotions	359	6	381	5
6	Burnout	267	4	376	5
7	Interventions	263	4	326	4
8	Language	235	4	255	3
9	Conflict	151	2	163	2
10	Compassion fatigue	132	2	278	3
11	Connection	113	2	128	2
12	Communication and language	104	2	112	1
13	Linguistics	82	1	85	1
14	Positive emotions	77	1	88	1
15	Patient-centered communication	73	1	76	1
16	Conflict management	73	1	75	1
17	Difficult patients	71	1	83	1
18	Emotional awareness	69	1	78	1
19	Negative emotions	56	1	66	1
20	Anger	56	1	64	1
21	Frustration	53	1	56	1
22	Language and emotions	28	0	30	0
23	Physician relationships	23	0	25	0
24	Discrimination	18	0	22	0
25	Social dynamics	17	0	19	0
26	Facial expressions	15	0	15	0
27	Interpersonal conflict	13	0	13	0
28	Psychosocial perspectives	9	0	11	0
29	Relationship dynamics	7	0	8	0
30	Resentment	4	0	4	0
31	Rumination	2	0	4	0
32	Conscious decision-making	3	0	3	0
33	Discrimination and lack of E/C	3	0	3	0
34	Compassionate communities	2	0	3	0
35	Self-talk	2	0	2	0
36	Conscious mind	1	0	1	0
37	Linguistic structures	1	0	1	0
38	Interpersonal conflict and lack of E/C	0	0	0	0
39	Pragmatics	0	0	0	0
40	Implicit bias	0	0	0	0
41	Resistant thought	0	0	0	0
42	Discrimination, negative thought, and lack of E/C	0	0	0	0
43	Explicit bias	0	0	0	0

between E and C for theoretical purposes may not be as useful in practice as in theory.

Finding 1 is consistent with results presented by Sulzer, Feinstein, and Wendland [3] in their review of 109 studies aimed at assessing empathy development in medical education. The authors found that most of the studies they reviewed were characterized by internal inconsistencies and vagueness in the conceptualization of E, pointing out that the methods most commonly used to measure E relied on self-report and cognition divorced from action, and as a result may not be able to predict the presence or absence of E in clinical settings. Their conclusion suggests the need for humanized perspectives of E.

Finding 2 (bias toward psychology) confirms the hypothesis. It implies that the literature associates E and C with the psychological tradition of studying non-naturally occurring data (NND), data elicited with researcher interventions such as prompts, reports, and surveys as opposed to data gathered without researcher intervention as it naturally emerges in human speech communities, known as naturally occurring data (NOD).

Wolfson [4] and Beebe and Cummings [5] were first to highlight the limitations of NND for purposes of understanding discourse features critical to meaning and intention well enough to serve as a sound basis for second language acquisition education. Later, Félix-Brasdefer [6] showed that using role-play as a data elicitation method for requests in Mexican Spanish was insufficient because it did not generate certain types of requests revealed through an analysis of NOD.

As these studies suggest, NND serves many study purposes and provides easier and faster access to data without the collection and transcription challenges of NOD, but it is not a substitute for NOD when the study goal is to explain complex human behaviors in ways that are accurate and meaningful to real-world pragmatic understanding.

Finding 3 (lack of significant association in the literature between E and C and *language/linguistics* and other disciplines and topics crucial to a pragmatic perspective of E and C) is the most salient finding in the review and supports the hypothesis.

I was perplexed to find an insignificant association between E/C and *language* (5%/4% respectively of the total results returned) or E/C and *linguistics* (1%/1%) since modern linguistics promotes the view that language is social behavior [7], a view that is valid in the light of research based on NOD involving real people and authentically evolving relationships and social contexts and circumstances.

I was equally perplexed to discover an insignificant association in the results between *language and emotions and E/C* (1%/1% respectively) since I had uncovered evidence of this association in an early ethnographic discourse

analysis study of expressions of disapproval [8] I conducted where I demonstrated how intimates commonly convey and respond to negative emotional meaning (criticism) using linguistic forms (syntactic and lexical-semantic surface structures) inconsistent with literal meaning, a finding I was able to quantify with the help of computer analysis at Yale University's Haskins Laboratory: I showed how the differences in voice pitch and frequency (paralinguistic/prosodic language symbols) that I had found to be determinant to communicative function in interpersonal behavior were measurably distinct [9].

Finding 3 is consistent with Finding 2 (bias toward psychology) and the tradition in research psychology to study emotions apart from social context, which has led many eminent psychologists to see language as detached from emotions, where it is seen to play only a descriptive role [10–12].

The oversight suggested by the lack of significant association in the literature between E and C and topics important to pragmatic understanding such as *relationship dynamics, conscious mind, rumination, self-talk, implicit bias, linguistic structures, resistant thought, and discrimination* reinforce this objectified and dehumanized view of emotions and becomes especially meaningful in the light of philosopher and cognitive scientist Chalmers' distinction between the *easy* and the *hard* problems of consciousness [13].

Chalmers explains how cognitive science is well suited to explaining the easy problems of consciousness, which he associates with cognitive abilities, functions, and behaviors that can be explained in terms of computational or neural mechanisms. He points out that the hard problem persists even when the performance of all relevant functions has been explained because it relates to the subjective way we process experience through perception.

Perception is critical to making sense of E and C from the perspective of communicative function and integral to the way we use language literally and symbolically to shape emotional values [14]. Yet, the topics mentioned above, which are critical to perception, were not significantly associated with E and C in the findings, further suggesting that E and C are understood from objectified and reductionist perspectives in the health-related literature.

Recommendations

I recommend interdisciplinary collaborations between research psychologists and outsiders to research psychology from different traditions and professional specializations, especially between researchers in psychology and linguists who study the communicative function of speech acts and speech events in NOD.

The findings and insights provided by such studies are invaluable to advancing a wider understanding of E and C that emerges as we expand our scope of observation

Table 4 Results Specific to *Medicine*

Ref#	Terms searched with E/C within <i>medicine</i>	# of results associated with E (N = 4329)	% of results associated with E	# of results associated with C (N = 5052)	% of results associated with C
1	Psychology	2159	50	2393	47
2	Communication	1183	27	1293	26
3	Emotions	637	15	692	14
4	Thought	490	11	537	11
5	Interventions	271	6	344	7
6	Language	223	5	248	5
7	Attitudes and emotions	203	5	219	4
8	Burnout	165	4	250	5
9	Patient-centered communication	128	3	139	3
10	Physician relationships	125	3	136	3
11	Communication and language	124	3	133	3
12	Conflict	108	2	132	3
13	Difficult patients	97	2	115	2
14	Positive emotions	89	2	103	2
15	Negative emotions	70	2	86	2
16	Emotional awareness	66	2	82	2
17	Connection	57	1	70	1
18	Facial expressions	58	1	58	1
19	Compassion fatigue	52	1	143	3
20	Anger	43	1	58	1
21	Linguistics	41	1	47	1
22	Language and emotions	42	1	43	1
23	Discrimination	36	1	42	1
24	Conflict management	33	1	39	1
25	Frustration	33	1	36	1
26	Psychosocial perspectives	15	0	18	0
27	Implicit bias	11	0	11	0
28	Conscious mind	10	0	10	0
29	Social dynamics	9	0	11	0
30	Interpersonal conflict	8	0	10	0
31	Relationship dynamics	7	0	7	0
32	Explicit bias	7	0	7	0
33	Conscious decision-making	5	0	5	0
34	Discrimination and lack of E/C	5	0	5	0
35	Resentment	2	0	4	0
36	Linguistic structures	1	0	1	0
37	Rumination	0	0	4	0
38	Compassionate communities	0	0	1	0
39	Self-talk	0	0	0	0
40	Interpersonal conflict and lack of E/C	0	0	0	0
41	Pragmatics	0	0	0	0
42	Resistant thought	0	0	0	0
43	Discrimination, negative thought, and lack of E/C	0	0	0	0

and analysis of interpersonal relationships across time, social contexts, and speech communities, and begin to make sense of the rich and complex sociolinguistic behaviors at the intersection of mind, thought, and social interaction. Since linguistics research is not subject to the same complications and restrictions regarding the study of human subjects as psychology and many other disciplines [15], linguists have easier access to NOD and, therefore, can provide study evidence and insights important to understanding the communicative function of E and C.

I especially recommend considering evidence and insights from ethnographic discourse analysis studies aimed at understanding the complex, entwined, and nuanced language behaviors associated with *interpersonal conflict and connection* [8, 9]. These studies inform a larger pragmatic picture of human behavior [14] that is important to understanding E and C from the perspective of communicative function.

Most importantly, ethnographic discourse analyses informing disapproval exchanges and interpersonal conflict from the perspective of communicative function provide evidence of the inextricable association between language and emotions, revealing how we draw on literal (linguistic) as well as nonliteral (emotional) language symbols to shape meaning and intention as we think about and interact with others [9, 14].

This evidence-based understanding of language and emotions is complementary to the understanding of E and C suggested by the findings in this review and offers a promising basis for exploring new directions in experimental study important to advancing a scientific understanding of E and C.

Specific to the urgent need for innovating effective interventions capable of advancing empathic and compassionate relationships and communities of healthcare, I recommend conducting a feasibility and acceptability study of *compassionate cooperation* [14], a customizable evidence-based methodology associated with the longitudinal study of various aspects of interpersonal conflict and connection in the ethnographic discourse analysis study tradition.

Compassionate cooperation methodology demonstrates a strong anecdotal history of effectiveness impacting positive and unifying social change at the community level, offering significant potential to serve as a tool for mitigating threats to empathic and compassionate relationships and communities of care such as those posed by difficult patients, frustrations among front-line providers, compassion fatigue, and recalcitrant personal biases that can easily lead to discrimination at the human systems level.

A feasibility and acceptability study of *compassionate cooperation* can pave the way for a Randomized Control

Trial, which is required to establish its effectiveness as a scientific tool for promoting empathic and compassionate relationships and communities of care. I encourage decision-makers in healthcare communities interested in exploring opportunities for collaboration to contact me.

Challenges to operationalizing the recommendations

The single greatest challenge to operationalizing the proposed recommendations is the way we tend to value, prioritize, and share knowledge in our human communities.

As the literature on social networks and social identity theory suggests, the dynamics of power conformity explain how we are predisposed to valuing and defending insiders to our own groups and the ideas we associate with them, and how we tend to follow the leaders of groups we value and desire to be tied to as insiders [16].

We tend to act according to the *birds of a feather* phenomenon [16, 17], which accounts for the way we seek to enhance personal self-image through our identity with insiders as we devalue and discount the views and contributions of outsiders [16], a tendency that can easily lead to thoughtless behavior toward others [18]. In academic circles, this can result in exclusions and oversights of potentially useful ideas.

Mitigating this challenge requires willful decision-making on the part of insiders, those individuals with influence and authority, to embrace outsiders and their distinctly different traditions, professional affiliations, accomplishments, and perspectives of E and C. It will not be easy, especially because specialists tend to use different language to talk about the same concepts, which adds to the challenges of collaboration, including deciphering findings as a non-specialist in a given area.

As Lakhmi, Jeppesen, Lohse, and Panetta [19] and Hong and Page [20] suggest, however, there is great promise in collaborating with diverse stakeholders, outsiders representing divergent approaches, specializations, and perspectives. Lakhmi et al. [19] concluded that scientific problem solving is enhanced by involving specialized solvers with a range of divergent interests at the boundary or outside their fields of expertise. In their extensive study, they disclosed 166 discrete scientific problems that had been internally unsolvable by 26 large and well-known R&D-intensive firms to more than 80,000 independent scientists from more than 150 countries. The outcome was that one-third of the problems that had been previously unsolvable by insiders were solved by the outsiders.

Similarly, Hong and Page [20] developed a model to explain the well-accepted claim that identity-diverse groups outperform homogeneous ones, explaining how functional diversity accounts for differences in the ways people encode and try to solve problems, which benefits advancement.

Conclusions

The gap in pragmatic perspective revealed in this review suggests a need in the health-related literature on E and C to bridge theoretical understanding with the practical understanding needed for understanding how and why we shape and inhibit empathic and compassionate relationship experiences and communities of healthcare.

The disciplines and topics associated with E and C in the literature that point to this gap reflect perspectives that are too narrow to account for the communicative function of E and C, the complicated and nuanced ways we shape meaning and intention within our own minds that we discriminately share with different others, constrained by social variables such as relationship (e.g., spouse or supervisor) in the light of our immediate and longer-term motivations and goals.

There exists an opportunity to understand E and C as emotionally symbolic expressions of language, integral to communicative function within the larger pragmatic picture of interpersonal conflict and connection [14]. This larger pragmatic picture provides a potentially useful framework for *connecting the dots* between the communicative function of E and C and the plethora of topics critical to it that were disassociated from E and C in the literature such as *bias, discrimination, frustration, resentment, resistant thought, self-talk, and social dynamics*.

It is essential that we understand these topics in relation to E and C from a humanized perspective well enough to serve useful and positive ends in healthcare contexts if we are to reduce their burden on public health. For instance, we can benefit from understanding E and C in ways that enable us to actively mitigate *bias* and *discrimination* that is rooted in race and gender identity, which have been shown to adversely impact health outcomes at the population level [21–23].

Significantly, this paper reflects an understanding of the cultural construction of empathic and compassionate interpersonal relationships within rich and complicated contexts specific to American English speech communities, understanding essential to evolving effective public health policy and especially useful to an international audience interested in advancing cross-cultural comparisons to further a fuller understanding of E and C in the human community.

It is my sincere hope it will prompt unusual interdisciplinary collaborations and new lines of scientific inquiry related to the communicative function of E and C within and among divergent human speech communities, and ultimately lead to the advancement of the science informing health policy.

History teaches us that dramatic changes in how we understand the world and our place in it do not make

their way easily into our minds and behaviors. Yet retrospectively, we can appreciate the benefits to scientific advancement of embracing complementary paradigms of understanding that offer potential for making sense of familiar topics and solving persistent challenges in novel ways.

Abbreviations

C: Compassion; E: Empathy; Ref: Reference

Author Contributions

The author read and approved the final manuscript.

Authors' information

Lynne D'Amico is an applied linguist who has been working as Knowledge-Shaping Solutions in metro Washington, DC since 2010, providing content and process solutions advancing unifying social change. Previously, she was employed by Georgetown University's Center for Intercultural Education and Development (USAID-ECESP) and Global Technology and Systems Intelligence Analysis Unit.

Ethics approval and consent to participate

Not applicable.

Competing interests

The author declares that she has no competing interests.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Received: 1 December 2017 Accepted: 1 May 2018

Published online: 10 May 2018

References

1. Del Canale S, Louis DZ, Maio V, Wang X, Rossi G, Hojat M, Gonnella JS. The relationship between physician empathy and disease complications: an empirical study of primary care physicians and their diabetic patients in Parma, Italy. *Acad Med*. 2012;87(9):1243–9. <https://doi.org/10.1097/ACM.0b013e3182628fbf>.
2. Kelley JM, Kraft-Todd G, Schapira L, Kossowsky J, Riess H. The influence of patient-clinician relationship on healthcare outcomes: a systematic review. *PLoS One*. 2014 Apr;9(4):e94207. <https://doi.org/10.1371/journal.pone.0094207>.
3. Sulzer SH, Feinstein NW, Wendland CL. Assessing empathy development in medical education: a systematic review. *Med Educ*. 2016;50(3):300–10. <https://doi.org/10.1111/medu.12806>.
4. Wolfson N. Perspectives: sociolinguistics and TESOL: Boston, MA, Heinle & Heinle; 1989.
5. Beebe LM, Cummings MC. Natural speech act data versus written questionnaire data: how data collection method affects speech act performance. In: SM Gass SM, Neu J, editors. *Speech act across cultures: challenges to communication in a second language*. Berlin: Mouton de Gruyter; 1996. p. 65–88.
6. Félix-Brasdefer JC. Natural speech versus elicited data: a comparison of natural and role-play requests in Mexican Spanish. *Span Context*. 2007;4: 159–85. <https://doi.org/10.1075/sic.4.2.03fel>.
7. Linguistic Society of America. <http://www.linguisticsociety.org/resource/sociolinguistics>. Accessed 4 May 2018.
8. D'Amico-Reisner L. An analysis of the surface structure of disapproval exchanges. In: Wolfson N, Judd E, editors. *Sociolinguistics and language education*. Rowley, MA: Newberry House; 1983. p. 103–15.
9. D'Amico-Reisner L. An ethnolinguistic study of disapproval exchanges. Philadelphia, PA: University of Pennsylvania; 1985.
10. Ekman P, Cordaro D. What is meant by calling emotions basic. *Emot Rev*. 2011;3(4):364–70.
11. Fontaine JRJ, Scherer KR, Soriano C. Components of emotional meaning: a sourcebook. Oxford: Oxford University Press; 2013.

12. Ekman P. What scientists who study emotions agree about. *Perspect Psychol Sci.* 2016;11(1):31–4. <https://doi.org/10.1177/1745691615596992>.
13. Chalmers DJ. Facing up to the problem of consciousness. *J Conscious Stud.* 2005;2(3):200–19.
14. D'Amico L. *Force of mind, song of heart: shaping consciousness, connection, and compassionate cooperation.* Bloomington, IN: Balboa Press; 2014.
15. Linguistic Society of America. Ethics committee statement. <https://www.linguisticsociety.org/sites/default/files/lsa-stmt-research-human-subjects.pdf>. Accessed 4 May 2018.
16. Katz N, Lazar D, Arrow H, Contractor N. Network Theory and Small Groups. *Small Group Research.* 2004;35(3).
17. McPherson M, Smith-Lovin L, Cook J. Birds of a feather: Homophily in social networks. *Annu Rev Sociol.* 2001;27:415–44. <https://doi.org/10.1146/annurev.soc.27.1.415>
18. Jeffrey D. Empathy, sympathy, and compassion in healthcare: is there a problem? Is there a difference? Does it matter? *J R Soc Med.* 2016;109(12): 446–52. <https://doi.org/10.1177/0141076816680120>.
19. Lakhani KR, Jeppesen LB, Lohse PA, Panetta JA. The value of openness in scientific problem solving. *Harvard business review.* 2007. <https://www.hbs.edu/faculty/Publication%20Files/07-050.pdf>. Accessed 20 Nov 2017.
20. Hong L, Page SE. Groups of diverse problem solvers can outperform groups of high-ability problem solvers. *Proc Natl Acad Sci.* 2004;101:16385–9.
21. Williams D, Sternthal M. Understanding racial/ethnic disparities in health: sociological contributions. *J Health Soc Behav.* 2012;51(Suppl):S15–27. <https://doi.org/10.1177/0022146510383838>.
22. Reisner SL, White JM, Bradford JB, Mimiaga MJ. Transgender health disparities: comparing full cohort and nested matched-pair study designs in a community health center. *LGBT Health.* 2014;1(3):177–84. <https://doi.org/10.1089/lgbt.2014.0009>.
23. Krieger, N. A glossary for social epidemiology. *J Epidemiol Community Health.* 2001;55(10). <https://doi.org/10.1136/jech.55.10.693>.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions

