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Assessing Empathy Development in Medical Education: A Systematic Review

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Abstract

Introduction—Empathy in doctor-patient relationships is a familiar topic for medical scholars, and a crucial goal for medical educators. Nonetheless, there are persistent disagreements in the research literature concerning how best to evaluate empathy among physicians, and whether empathy declines or increases across medical education. Some researchers have argued that the instruments used to study “empathy” may not be measuring anything meaningful to clinical practice or to patient satisfaction.

Methods—We performed a systematic review to learn how empathy is conceptualized in medical education research. How do researchers define the central construct of empathy, and what do they choose to measure? How well do definitions and operationalizations match?

Results—Among the 109 studies that met our search criteria, 20% failed to define the central construct of empathy at all, and only 13% had an operationalization that was well-matched to the definition provided. The majority of studies were characterized by internal inconsistencies and vagueness in both the conceptualization and operationalization of empathy, constraining the validity and usefulness of the research. The methods most commonly used to measure empathy relied heavily on self-report and cognition divorced from action, and may therefore have limited power to predict the presence or absence of empathy in clinical settings. Finally, the large majority of studies treated empathy itself as a black box, using global construct measurements that are unable to shed light on the underlying processes that produce empathic response.

Discussion—We suggest that future research should follow the lead of basic scientific research that conceptualizes empathy as *relational*—an engagement between a subject and an object—rather than a personal quality that may be modified wholesale through appropriate training.

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Introduction

Rationale

Empathy in doctor-patient relationships is a familiar topic for medical scholars, and a crucial goal for medical educators. Yet definitions of empathy are not consistent from one piece of scholarship to another, and sharp disagreement remains on some basic issues in the field.

Humanists, ethicists, and social scientists agree that empathy is critical—and very often lacking—in medical care. In his widely read book, *The Silent World of Doctor and Patient*, the ethicist Jay Katz¹ examined the obstacles that prevent honest and empathic communication between physicians and the people they serve. Empathy is also a predictable theme in artistic depictions of medicine and medical training. Novels that portray the destruction of empathy, such as *House of God*, are handed down from one generation of medical students to the next, while the popular television show *House, M.D.* openly celebrates a doctor's disregard for bedside manner, implicitly communicating that one can be a good doctor without mastering the interpersonal dimensions of the job.² Such behavior is not confined to fiction: schooled in the hidden curriculum of clinical internships and residency, new doctors learn to mock certain groups of patients.³

While the development of empathy among medical trainees has been an important goal for medical educators, it has also been an intriguing conundrum for researchers: a substantial (if somewhat controversial) body of research has demonstrated that empathy typically *decreases* during medical training.⁴ Medical schools and medical associations take the problem seriously: the development of empathy in professional conduct is an explicit goal of both the American Association of Medical Colleges and the Accreditation Council for Graduate Medical Education. Yet despite a host of intervention strategies, “medical education still seems surprisingly ineffective in helping students walk a mile in their patients’ shoes.”⁵ This persistent problem has led some researchers to suggest that the problem is selection, rather than treatment—that medical schools must find ways to identify and recruit students who are more empathic or have better communication skills to begin with. The assumption underlying such proposals seems to be that empathy is a personal and relatively immutable characteristic: one either has it, or one does not.

Other researchers question whether this much-lamented empathy decline is actually real, pointing to problems in study design and instrumentation.⁶ Two recent reviews of changes in empathy among medical students and residents reached disparate conclusions. In a systematic review, Neumann and colleagues found that empathy declines during medical training as students engage more with patients.⁷ Colliver and colleagues conducted a meta-analysis drawing on much of the same research and concluded that declines in empathy during medical training are minimal, perhaps even nonexistent.⁶ This second group also argued that the instruments used to study “empathy” may not be measuring anything meaningful to clinical practice or to patient satisfaction. (For example, most past research has utilized student self-assessments, which may be an ineffective way to measure empathy.) The discrepancy between these two reviews poses serious concerns for researchers and educators seeking to maximize empathy in medical practice. Furthermore, although there is controversy over the effect of medical training on empathy, there is relatively little

controversy surrounding the need for more empathic medical practice; under such circumstances, it would be unfortunate to take solace in the possibility that empathy does not decline during medical training.

Objectives

To foster better and more useful research on empathy in medical training, we designed a systematic review to learn how empathy is defined and operationalized in medical education research—how do researchers define the central construct of empathy, and what do they choose to measure?—as well as how well definitions compare to the operationalizations used. Our review is unusual in that it focuses on the conceptualization of empathy in empirical research studies, rather than the results of those studies. Certain features common to most systematic reviews, such as a consideration of bias in the reporting and interpretation of results, are therefore not appropriate for our review. Whereas most systematic reviews and meta-analyses focus on the methods and results of empirical research, we believe that conceptual and definitional issues that *precede* methodological decisions are key to understanding the state of the field—that an incomplete, poorly articulated understanding of empathy is at the root of both the discordant results and the limited success in educational intervention. In this view, an analysis of the existing state of empathy definitions and operationalization is the first step to rethinking medical education research on empathy.

Methods

Information Sources and Search

We systematically queried the following databases for relevant English-language studies published before November 1, 2012: PubMed, EMBASE, Scopus, Cumulative Index to Nursing and Allied Health (CINAHL), Web of Science, PsycInfo, and Education Resource Information Center (ERIC). The following terms were used in combination to search all databases: *professional education* or *clinical education* or *medical education*; *medical students*, *nursing students*, *psychology students*, and *dental students*; *empathy* or *empathi**. With the guidance of a library science expert, we added search terms tailored to each database. Synonyms for each of the above terms used in specific databases were also searched. For more details on the search strategies used within each database, see Appendix 1.

Eligibility Criteria

For this systematic review, we included English-language publications that (1) examined physicians, medical students or residents, (2) operationalized empathy in an empirical study, and (3) included some quantitative component. Under the guidance of our library science expert, we included all studies published before November 1, 2012 and did not exclude articles published before any particular time point. The time range of publications does vary for each database and is noted in Appendix 1. While our initial search terms included non-physician health care personnel, we ultimately excluded studies in which the study's main focus was not physicians or physician trainees. We also excluded editorials or essays that lacked an empirical component, and publications for which our librarians could not locate a full-text article. We elected to include only studies that had a quantitative component. This

necessarily removes many high quality studies from consideration of how empathy is being assessed in medical education.

Study Selection: Title and Abstract Review

Our initial search yielded 1,811 articles. After removing duplicates, 1,210 articles remained. The first author (S.S.) and a trained research assistant independently reviewed the title and abstracts of each article for appropriate population and subject area, which resulted in a total of 305 articles. Any articles the reviewers disagreed on or that lacked sufficient information were included for full text review.

Data Collection Process and Data Items

For the remaining 305 articles, the full text was examined for goodness of fit with the study criteria. 196 additional publications were excluded based on this review, leaving 109 articles.^{4,8–115} Subsequently, the following information was extracted from each remaining article: the definition of empathy (if present), and whether the definition incorporated thinking, feeling, acting or more than one of these components. Additionally, we extracted the means by which empathy was operationalized, including the scales, questionnaires, or other mechanisms used to measure empathy when these could be identified. We also coded articles for the party evaluating empathy: self, patient, or other. Two authors (S.S. and C.W.) each coded full-text articles, and resolved discrepancies by reaching a consensus.

Data Analysis and Summary Measures

We entered the above data categories into an Excel file, and calculated descriptive statistics for each variable. We analyzed the presence or absence of empathy definitions, and the complexity and variation in definitions in relation to various forms of operationalization. As noted above, our central questions concerned the strength of the conceptual foundations on which this body of research has been built, rather than the research designs within which concepts of empathy have been deployed. Therefore, we deemed it inappropriate to evaluate study strength through meta-analytic measures. The approach we used instead provides a comparison of the underlying conceptual frameworks within empathy research in medical education.

Results

Definition of Empathy

Other authors have noted that there is little consensus on definitions of empathy.¹¹⁶ Those definitions that exist may emphasize cognitive, emotional, or behavioral elements—or some combination thereof. In our review, 22 of 109 articles (20%) included no definition of empathy at all. For the 87 articles that did provide definitions, we coded whether those definitions included elements related to thinking, feeling, or acting. A definition could incorporate one, two, or all three elements, and we included verbal communications under the rubric of “acting.” A list of words used to identify thinking, feeling, and action can be found in Appendix 2. Seventy-four articles (82% of articles providing a definition) defined empathy as consisting in part or entirely of a cognitive, thinking process. Thirty-two (37%) defined empathy as consisting in part or entirely of a feeling process. And 53 (61%) defined

empathy as including an action component. Overall, the majority of definitions included components from more than one domain (see Figure 2). Thinking or cognitive processes were the most prevalent component of empathy definitions, and present in the top four categories. Feeling or affective processes are the least prevalent in definitions.

Operationalization of Empathy

All of the studies included in our sample (109) operationalized empathy in the sense that every study sought to measure, assess, or evaluate it in some way. Ninety-five (87%) used some sort of scalar tool to evaluate empathy, and 43 (39%) used a non-scalar tool (for instance, asking patients to describe physicians' empathy). Twenty-nine studies (27%) used both. The most common scalar instrument was the Jefferson Scale of Physician Empathy (JSPE). Forty-five (41%) studies used either the JSPE or the JSPE-Student Version. Nineteen (17%) used the Interpersonal Reactivity Index (IRI). Five (5%) used the Hogan Empathy Scale. The Balanced Emotional Empathy Scale (BEES), the Barrett-Lennard Scale, the Accurate Empathy Scale and the Consultation and Relational Empathy Measure (CARE) were each used four times (4% for each). More than a dozen other scales were used more rarely, typically in a single study.

Assignment of Empathy

We evaluated who determined the presence or absence of empathy in the context of each study. Studies most commonly used self-report: 66 of 109 (61%) used *only* self-reporting tools, while an additional thirteen articles used self-report in combination with another source of evaluation. In total, 79 used self-report (72%), 18 relied on patient or standardized-patient reports (17%), and 28 (26%) used a third-party report such as that of a faculty member, a trained observer, or a peer. Few studies (fourteen, or 13% of the total) used reports from multiple perspectives, typically combining self-report with that of an observer.

Empathy as a Construct

To assess operationalization, we examined each instrument used to quantify empathy, to identify whether it assessed physicians' (or trainee physicians') cognitive processes, feelings, or behaviors. In seven cases, we were unable to assess details of the scale used, because it was either proprietary or in a non-English language (despite publication of the study in English).

The same word list used to assess definitions was used to assess operationalizations (see Appendix 2). For instance, one study trained coders to examine videotaped encounters between physicians and patients; the coders counted several specific physician behaviors, both verbal (such as interrupting, supportive talk, etc.) and non-verbal (eye contact, silence, etcetera) and divided them by the total number of utterances in the encounter.²⁵ This operationalization was coded as "acting."

Finally, we extracted whether empathy was conceptualized as (a) a global construct to be measured in presence, absence or degree; or (b) a summation of multiple component parts. Among the papers for which we could assess details of operationalization, eighty operationalized empathy as a global construct (78%), and 45 (44%) operationalized empathy

as a composite construct, as in the example above. Fifteen publications (15%) operationalized empathy in both ways.

Consistency between Definition and Operationalization

Rather than measuring the empirical quality of the studies, our conceptually focused analysis judged quality by assessing whether or not a study's definition of empathy was aligned with how the authors chose to operationalize and evaluate empathy. Specifically, we compared our coding of the definitions of empathy with our coding for operationalizations of empathy. For example, several studies used the definition of empathy provided by Hojat and colleagues, developers of the Jefferson Scale of Physician Empathy: "a predominantly cognitive (as opposed to affective or emotional) attribute that involves an understanding (as opposed to feeling) of patients' experiences, concerns, and perspectives combined with a capacity to communicate this understanding."^{117p74} We coded this definition as including *thinking* and *acting* components, but not *feeling*. An examination of the items in the JSPE scale shows an extensive focus on thinking, with no items on action. A study that used this definition and operationalized it with the JSPE alone would be considered non-matching. Each study in the database for which we could assess operationalization was coded in this way. Studies that did not include a definition were automatically rated as non-matching. Only 13 of 102 studies (13%) had matching operationalizations and definitions across these dimensions.

Discussion

Summary of Evidence

Empirical studies on empathy in medical education, though increasingly common, are still outnumbered by commentaries. Furthermore, our analysis reveals that many of these studies are characterized by internal inconsistencies and vagueness in both the conceptualization and operationalization of empathy, limiting the validity and usefulness of the research.

One-fifth of the studies in our sample failed to define the central construct of empathy, either (a) relying on commonsense notions of empathy, or (b) using a scale or other instrument as a de facto definition of empathy. Relying on commonsense ideas presumes a consensus about the definition and characteristics of empathy that is notably absent from the literature. Using a measurement tool as an implicit definition is problematic because it is the construct definition that enables other scholars to judge whether a particular instrument is appropriate and the resulting claims are valid.

All of the studies that defined empathy incorporated at least one of the three domains *thinking*, *feeling*, and *acting*, although there was no consensus about which of these were the key components. Twelve studies (14%) integrated all three dimensions. For example, Shanafelt and colleagues defined empathy as "the ability to listen to a patient, understand their perspective, sympathize with their experience, and express understanding, respect, and support."⁹⁶ Another 51 (59%) included two dimensions, most commonly thinking and acting (34, or 39%). Thus, in a 2004 paper Hojat and colleagues defined empathy as "a cognitive attribute that involves an understanding of the inner experiences and perspectives

of the patient as a separate individual, combined with a capability to communicate this understanding to the patient.”^{118p935} Only a quarter of the studies that defined empathy included its feeling dimension—and some quite specifically excluded it—despite the etymological origins of empathy in “feeling in” or “feeling with.”

A surprising majority of studies contained *internal* contradictions, with definitions that focused on different dimensions (i.e., thinking, feeling, and acting) than the accompanying scales or research instruments. Of the 81 studies that defined empathy, and whose instruments we were able to access and code, only 11 studies (14%) defined and operationalized empathy consistently.

Looking across all studies included in the review, our analysis reveals that the methods used to study empathy have limited power to predict the presence or absence of empathy in clinical settings. The most common instruments for measuring empathy rely on self-report, which as Colliver and colleagues remind us, is only loosely correlated with behavior.⁶ Furthermore, many instruments place a heavy emphasis on cognition—thoughts related to empathy. The best research on medical thought and clinical judgment has always paired cognition with its action consequences because the predictive value of cognition alone is limited.¹¹⁹ In short, by focusing on what doctors and medical trainees self-report, and especially on the *thoughts* that they report, existing research on empathy offers a tenuous connection to clinical settings.

This research focuses on the conceptual quality of empirical research on empathy in medical education, and as such is only half of the story. It should ideally be read in the context of other research, such as that done by Colliver and colleagues, that sheds light on the technical quality of research in the field. Furthermore, by omitting studies that lacked a clear quantitative component, we present a somewhat narrow view of research in the field. Although excluding purely qualitative research removed many potentially high-quality studies from our sample, we believe our focus on quantitative and mixed-methods studies is justified by both the influential role of quantitative research in the medical education literature (as exemplified by the two prominent reviews described above) and the particular problems of *operationalizing* a complex variable in quantitative research. Finally, given the widespread heterogeneity in approaches, our analysis was limited in its ability to deeply explore the characteristics of any specific subset of approach.

Conclusions

The various conceptual flaws noted above—lack of definition, mismatch between definition and operationalization, an over-reliance on cognition and self-report—raise significant challenges to the validity of research on empathy in medical education.

Our greatest concern, however, is the degree to which empirical studies treat empathy itself as a black box, and are thus incapable of shedding light on the mechanisms that underlie clinician empathy. Most studies (61%) assessed empathy solely through self-assessment by clinicians or students, an operationalization that presumes it to be a quality inherent in the individual and independent of any given relationship. Nearly two thirds of the studies in this

review operationalized empathy solely as a global construct that increases or decreases monolithically, rather than something with interacting component parts. Should educators focus on cognitive or affective interventions to enhance clinician empathy? Without understanding the underlying mechanisms, we cannot know. Furthermore, it is entirely possible that there are multiple pathways leading to empathic response. Research into the mechanisms of clinician empathy is needed to help medical educators guide students to a better understanding of their own strengths.

Basic scientific research (including evolutionary psychology and primate studies) offers some leads that medical social science might follow in investigating the underlying mechanisms of empathy.¹⁴ Rather than a personal quality that may be modified wholesale through appropriate training, this research suggests that empathy is *relational*—an engagement between a subject and an object. Furthermore, this research suggests that *empathy favors individuals who we perceive as similar to ourselves*.⁸ Shielding oneself from identifying with another—a widely noted consequence of medical education—may actually *reduce* empathy.¹⁵ This hypothesis requires in-depth investigation—yet if confirmed, it would reveal a far-reaching problem with medical education. It is challenges like these that research on empathy should strive to identify and address. Understanding the mechanisms that shape empathy in the doctor-patient relationship deserves more careful attention.

Appendix 1: Search Terms

PubMed search: (Education, professional OR “Professional Education” OR “Medical Students” OR “Nursing Students” OR “Psychology Students”) AND (Empathy OR Empathi*)

183 articles found.

MeSH Term: “Professional Education”

Date: 1887 (UNC Library site)

EMBASE search: (Medical Education OR Clinical Education OR Medical School OR “Medical Students” OR “Nursing Students” OR “Psychology Students”) AND (Empathy OR Empathi*)

465 articles found.

Emtree for “Professional Education” resulted in the substitution for Medical Education, Clinical Education, and Medical School.

EMBASE has been indexed since 1947.

Scopus search: (Education, professional OR “Professional Education” OR “Medical Education” OR “Medical Students” OR “Dental Students” OR “Nursing Students” OR “Psychology Students”) AND (Empathy OR Empathi*)

794 articles found.

Date: 1996 (UNC Library cite)

CINAHL search: (“Clinical Education” OR “Health Sciences Education” OR “Medical Education” OR “Professional Education” OR “Medical Students” OR “Dental Students” OR “Nursing Students” OR “Psychology Students”) AND (Empathy OR Empathi*)

48 articles found.

Headings

Support website said 1937, but UNC Library site said 1982.

Web of Science search: (“Health Sciences Education” OR “Medical Education” OR “Clinical Education” OR “Professional Education” OR “Medical Students” OR “Dental Students” OR “Nursing Students” OR “Psychology Students”) AND (Empathy OR Empathi*)

80 articles found.

Date: 1955 (UNC Library site)

PsycInfo search: (“Health Sciences Education” OR “Medical Education” OR “Clinical Education” OR “Professional Education” OR “Medical Students” OR “Dental Students” OR “Nursing Students” OR “Psychology Students”) AND (Empathy OR Empathi*)

228 articles found.

Headings

Date: 1887 (UNC Library site)

ERIC search: (“Health Sciences Education” OR “Medical Education” OR “Clinical Education” OR “Professional Education” OR “Medical Students” OR “Dental Students” OR “Nursing Students” OR “Psychology Students”) AND (Empathy OR Empathi*)

13 articles found.

No mesh terms, just field term

Indexing and abstracting since 1966.

Appendix 2: Coding Terms

(Note: Two authors (SS and CW) brainstormed this list of terms before coding began. In each case, cognates were also included. In most cases, definitions using these terms explicitly referred to cognitive, behavioral, or affective components to which they were linked.)

THINKING

Cognition

perspective-taking

imagination/imagining

apprehension
understanding
seeing
perceiving
processing
comprehend
appreciation of
knowledge
recognize
identification
controlled
intellectually sense
role-taking
grasp
identify with
FEELING
Compassion
feeling
emotion
concern
“joining with patient’s feelings”
to enter into or join with feelings
socio-emotional
care
emotional participation
affective
vicarious emotional response
generation of similar feelings
sharing of emotions
sense
emotional contagion
sympathize

match/experience someone's emotional state

emotive

specific feeling words: e.g. angry, enjoy, care, sad, etcetera

ACTION

Communication

Conveying

behavioral

express

listen

interrupt

eye contact

Appendix 3: Table of Extracted Codes

Year	Last Name of First Author	Coding of Definitions									
		Thinking	Feeling	Acting	No Definition	Scalar	Non Scalar	Thinking	Feeling	Acting	Se
2011	Berg	1		1		1	1	1	1		
1985	Jarski	1				1		1	1	1	
2007	Chen	1		1		1		1	1		
2013	Costa	1		1		1		1	1		
2007	Austin	1				1		1	1		
2007	West	1		1		1	1	1	1	1	
2011	Abreu	1	1			1		1	1		
2012	Garrouette	1				1				1	
2010	Michalec				1	1		1	1		
2004	Hojat	1		1		1		1	1		
1988	Jarski	1				1		1	1	1	
1982	Malpiede				1	1		1	1	1	
2010	Wimmers			1		1	1	1	1		
1996	Yarnold	1	1			1		1	1	1	
1998	Colliver				1		1			1	
2001	Gallagher				1		1			1	
2011	Lim	1	1			1	1	1	1		
2012	Paro				1	1		1	1		
2009	Spiegel				1		1			1	
2013	Consoli				1	1	1	1	1	1	
2008	Stratton				1	1	1	1	1	1	

Year	Last Name of First Author	Coding of Definitions									
		Thinking	Feeling	Acting	No Definition	Scalar	Non Scalar	Thinking	Feeling	Acting	Se
2013	Kondo	1				1				1	
2012	Chen	1		1		1	1	1	1		
2009	Crandall	1		1		1		1	1		
2008	Harlak				1	1	1				
2012	Dehning	1	1			1		1	1	1	
2010	Chen	1		1		1	1	1	1		
2004	Fields	1		1		1		1	1		
1996	Carmel		1	1		1	1	1	1	1	
2004	Easter				1		1			1	
2007	Hojat	1		1			1			1	
2013	Chang				1		1			1	
1974	Charles	1				1	1	1	1	1	
2009	Bunn	1		1		1	1	1	1		
2007	Neumann	1		1		1	1			1	
2013	Imran				1	1	1	1	1	1	
2005	Tai t				1	1		1	1	1	
1998	Klischcz	1	1			1	1	1	1	1	
2005	Stratton				1	1	1	1	1	1	
2002	Bylund	1	1			1				1	
2011	Hojat	1		1		1	1	1	1		
1988	Hornblow				1		1	1			
2013	Lelora n	1		1		1	1	1	1		
2007	Wickramasekera	1				1	1	1	1	1	
2001	Bailey	1	1			1		1	1	1	
1982	Elizur	1	1	1		1	1	1	1	1	
1977	Fine				1	1				1	
2013	Goncalves-Pereira				1	1		1	1		
1992	Higgins	1		1		1	1	1	1	1	
2005	Hojat	1		1		1		1	1		
2011	Hojat	1		1		1	1	1	1		
1984	Hong	1	1			1	1	1	1		
2011	Magalhaes	1	1				1	1	1		
1996	Ogle	1	1	1		1	1	1	1		
2008	Rahimi-Madiseh	1	1			1	1	1	1		
2008	Shariat				1	1		1	1		
2010	Tavakol	1				1		1	1		
2013	Hojat	1		1		1		1	1		
1993	Tamburrino				1	1		*	*	*	

Year	Last Name of First Author	Coding of Definitions									
		Thinking	Feeling	Acting	No Definition	Scalar	Non Scalar	Thinking	Feeling	Acting	Se
2000	Winefield			1		1		*	*	*	
2011	Baykan	1	1	1		1		*	*	*	
2005	Bylund	1	1	1			1			1	
2013	Lim	1		1		1		1	1		
2007	Thomas	1	1			1		1	1	1	
2011	Rosenthal	1		1		1		1	1		
2009	Bonvicini			1		1				1	
2008	Fernandez-Olano	1				1		1	1		
1989	Kramer			1			1			1	
2000	Morton	1				1		1	1	1	
2008	Newton	1	1			1		1	1	1	
1980	Poole			1		1				1	
2012	Kataoka	1		1		1		1	1		
1993	Evans			1		1		1	1	1	
2011	Berg	1		1		1	1	1	1	1	
2008	Morse			1			1			1	
2005	Bellini	1	1				1	1	1	1	
2008	Bonvicini	1	1	1		1		*	*	*	
2003	Hojat	1		1		1		1	1		
2011	Pollak	1					1			1	
2001	DeCoster				1		1		1	1	
2011	Hojat	1		1		1		1	1		
2011	Tavakol	1				1		1	1		
2005	Shanafelt	1	1	1		1	1	1	1	1	
2007	Glaser	1		1		1		1	1		
2005	Hojat	1				1		1	1		
2010	Colliver				1	1	1	1	1		
2013	Preusche	1	1	1		1		1	1		
2000	Switzer		1			1		1	1	1	
1980	Sanson-Fisher		1	1		1				1	
2011	Faye	1		1		1		*	*	*	
2013	Batt-Rawden	1		1		1	1	1	1		
2009	Hojat	1		1		1		1	1		
2012	Passalacqua	1	1			1		*	*	*	
2011	Weng	1		1		1		1	1		
2004	Kim	1	1	1		1				1	
2011	Neumann	1	1	1		1				1	
2007	Nicolai	1		1		1				1	

Year	Last Name of First Author	Coding of Definitions									
		Thinking	Feeling	Acting	No Definition	Scalar	Non Scalar	Thinking	Feeling	Acting	Se
2009	Di	1		1		1		1	1		
2001	Hojat	1				1		1	1		
2012	Suh	1				1		1	1		
2012	Canale	1				1		1	1		
1979	Christiansen	1				1		1	1	1	
2009	Spreng		1			1		1	1	1	
2011	Bayne	1	1	1		1				1	
2013	Garcia	1	1	1		1				1	
1978	Sanson-Fisher				1	1				1	
2007	Silvester		1	1		1		*	*	*	
2002	Bellini		1			1		1	1	1	
2013	Newton	1	1	1		1				1	
	TOTALS	74	32	53	22	95	43	75	75	55	

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Figure 1.
Systematic Review Inclusion Process

Figure 2.
Frequency of Components in Empathy Definitions