Measuring empathy: A literature review of available tools

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ABSTRACT. L'empatia è definita come la capacità di un individuo di capire come si sente l'altro, acquisirne lo stato d'animo e stargli emotivamente vicino. Lo scopo di questo studio è stato, attraverso la ricerca della letteratura e la definizione dell'empatia, quello di evidenziare l'importanza del costrutto, evidenziando le metodologie più usate negli ultimi 15 anni. È emerso che la tipologia di metodi più usata sono i questionari self-report ma che esistono altri strumenti per misurare l'empatia, i quali non sono di facile impiego a causa della scarsa esplicazione sull'uso o sulla categoria di strumento a cui sono riferiti.

SUMMARY. Empathy is described as a complex construct that develops the whole life of a person. It is defined as the capability of a person to understand the other person's feelings, to be able to feel the same way the other person does and to be capable to take action to resolve the problem of that individual. There are three major categories of empathy, i.e., affective, cognitive and compassionate. All are very important to clinical psychology, interpersonal relationships, and psychological assessment. The aim of this study was to conduct a literature review to describe the most widely used instruments to measure empathy in the range of the last fifteen years. The results showed that there are different approaches to measuring empathy, with the most popular ones being self–reports.

Keywords: *Empathy, Measure, Self–report, Review*

INTRODUCTION

Empathy is a complex construct that is defined as a process that changes more or less the whole life of the individual (Zillmann, 1991). It starts to develop from the minute that the person is born till the end of his life (Zahn–Waxler, Robinson & Emde, 1992). However, there is no proof that empathy increases with age, even if some developmental changes of it are typically seen in childhood (O'Brien, Konrath, Gruhn & Hagen, 2012) – this change is determined by the increase of cognitive capabilities – like the capability to take other's perspective and decide how to act in a certain situation. Also, no cross–sectional study suggests an age–related increase in empathy, while the only systematic longitudinal study available indicates that self–reported empathy may decline with age, but quite modestly. Given this state of art of the literature, we still do not know whether empathy shows long–term modifications and, if so, whether long–term change in empathy depends on people's age or other person characteristics, such as a cognitive decline due to elderly (Grühn, Rebucal, Diehl, Lumley & Labouvie–Vief, 2008).

However, not always a person can choose how to react, sometimes it is an automatic response that a person has from the beginning of his life (Wellman, Cross & Watson, 2001). There are also different factors that influence the development of empathy. For example, the temperament a child is born with (Cornell & Frick, 2007), environmental, cultural factors and mental capabilities. Empathy is defined as a capability of a person to understand how another person feels, be able to feel those feelings together or be able to find a way to help solve problems that caused those feelings (de Waal, 2009). All these factors depend on different types of empathy. Affective empathy refers to the ability of a person to perceive and share other individual's emotional states and feelings (de Waal, 2009). Emotional empathy is the one that a person is born with – in other words, it is an automatic emotional response to the environmental stimulus (Martin & Clark, 1982). If a person is capable to understand how another person is feeling, or how his behavior might influence another person's feelings – that would be cognitive empathy (Decety & Lamm, 2006). Said differently, cognitive empathy is a skill that human beings develop throughout their whole life span – from the personal experiences and different types of emotions. It is learned from daily life, and in adulthood it allows a person to decide what type of response to adopt depending on the situation, or not to show any reaction at all (Batson, Ahmad & Stocks, 2004). If a person is capable to understand another person's feelings because of the situation he is in, and is able to try to find a way to resolve that problem – that would be compassionate empathy (Borg, Brenner & Berry, 2014). Thus, compassionate empathy is a more sophisticated level, which develops with age. In adulthood, one should be able to evaluate the situation, and to take an actual action to resolve it (Goleman, 2007). Empathy is considered to be the most important element of the relationship between patient and a person who works in the clinical environment (Hojat et al., 2002), and it is a crucial element to be considered during psychological assessment – as a lack of empathy characterizes several psychopathological conditions such as narcissism, antisocial disorder, and psychopathy. Despite the relevance of empathy to psychological assessment and clinical psychology, the literature on this construct is not very well organized, and for this reason, it is often difficult to find what a professional is looking for, especially when one needs to decide which instrument(s) to adopt for his/her clinical or research purposes. To fill this gap, the aim of the current article was to analyze and summarize literature of last fifteen years, so as to put all the most popular ways to measure empathy in one place. In this way, a researcher can see what is available for him/her and can choose the type of measurement that is most likely best for him/her. As such, our goal was to find all tools of measurement, describe their advantages and disadvantages, define the structure of each instrument and, of course, describe its psychometric characteristics. Moreover, we also intended to describe the tools that appear doubtful, and that maybe would not be so good to use when measuring empathy.

METHOD

This literature review was made during October, 2015 and January, 2016. Two different databases were utilized, i.e., ProQuest and PubMed. The steps of this search were planned ahead of time. Firstly, by brainstorming, two lists of key–words were produced. In the first of these lists, some synonyms of "empathy" or related expressions were formulated; in the second, a list of words describing "measurement" was generated. The synonyms or expressions related to "empathy" utilized for the first list were: "empathetic," "empathic," and "empathizing". In Appendix I, it is reported the second list of the words that were used to search for measurement.

For each search in both databases, these two categories were combined by using the option of "AND", so that in each search one word from the empathy group and one from the measurement group were inputted. This procedure was repeated for all possible combinations, i.e., each and every key–word from both groups was searched together. The words that found at least 1 correspondence with empathy semantic group are shown in Table 1.

Secondly, some inclusion criteria were established. Specifically, it was decided to use articles in the time frame from 2000 and 2015, only in English language, only with availability of full texts, and only articles published in academic journals (the dissertations or theses were excluded). This choice aimed at restricting the field to the most psychometrically sound and widely used tools.

Initially it was also considered to search for key–words both between titles and abstracts of the articles, but millions of studies were found, and for this reason it was very difficult to understand which articles were useful and which ones were not of our interest. Therefore, ultimately it was chosen to limit our search to key–words only in the titles.

Later on, when all suitable for the criteria of the research

Table 1 – The list of key–words and frequency between each other

		Frequency				Frequency	
	Measure	**PsycInfo**	**PubMed**		**Measure**	**PsycInfo**	**PubMed**
Empathetic	Evaluation	0	1		Scale	1	0
	Function	0	1		Testing	0	1
	Measuring	0	3		Tool	0	0
	Scale	0	2	Empathy	Assess	0	2
	Self–report	1	1		Assessing	7	12
	Test	0	1		Assessment	1	15
Empathic	Assessing	2	4		Degree	1	5
	Assessment	0	2		Detection	0	4
	Degree	0	1		Evaluating	1	3
	Detection	0	2		Evaluation	5	16
	Evaluating	0	1		Examination	4	5
	Evaluation	0	1		Examining	4	7
	Examining	1	3		Function	2	7
	Functioning	1	2		Functioning	5	22
	Identifying	0	1		Identify	0	1
	Interview	0	1		Identifying	0	1
	Level	1	0		Index	10	7
	Measure	1	3		Instrument	0	1
	Measuring	0	3		Interview	0	2
	Performance	0	1		Level	4	11
	Questionnaire	0	2		Measure	8	23
	Rating	1	0		Measuring	4	8
	Scale	0	2		Performance	2	13
	Score	1	1		Questionnaire	3	6
	Scoring	0	0		Quotient	8	9
	Self–report	0	3		Rating	3	0
	Survey	0	0		Scale	8	48
	Task	0	1		Score	2	2
	Test	1	1		Self–report	2	7
	Testing	0	1		Survey	1	8
Empathizing	Assessment	1	0		Task	1	9
	Level	0	1		Test	2	7
	Measuring	0	1		Testing	4	7
	Quotient	1	0		Tool	0	6

articles were found, some categorization was made to make the research easier to follow. It was decided to save the used database, authors of the articles, the title, the abstract (if it was missing while saving, it had to be found and copied by hand), year of publication and the title of the publication. Duplicates were deleted and it was chosen to use articles that were considering adults only. Moreover, instruments assessing empathy were searched mainly in the titles, but this was not the only way to generate our list of all described measures – abstracts and whole articles were considered as well. In other words, if an abstract or an article was referencing to a specific measure it had to be included in the list of all instruments as well. Furthermore, because our goal was to present a list with the most widely investigated and/or utilized measures of empathy, if an article described more than one empathy tool, that article would eventually contribute to our list multiple times, i.e., all tools described in that article would appear in our final list. After reading all the articles, it was seen that the majority of the studies were about self–report methods and only a small part of the articles did not enter to that category. Thus, it was decided to organize the results into two chief sections – *self–reports* and *other*. That is, all the studies that were not about *self–report* methods (included those in which the methodological approach was not described clearly) were put together into one separate group, i.e., *other*.

RESULTS

After performing a literature search by the structured methods explained before, 436 articles were found in total from both databases (i.e., ProQuest and PubMed). As noted above, duplicates and articles with empathy measures not focused on adults were then excluded from the list. Thus, the working list was eventually reduced to 252 articles.

Next, we defined how to organize and categorize the instruments retrieved from those articles by reading the full texts one more time. Most of the studies were about self–report methods to measure empathy; others were considered to be performance–based and/or rating scales. More in detail, the resultant categorization was as follows: 223 articles for self–report articles, 20 for performance–based methods and 11 for rating scales methods.

Subsequently, a few additional adjustments were made. For example, our initial categorization was mainly based on our reading of the abstracts of the articles. However, when we read the whole texts, we realized that some of the articles that we initially considered to be involving performance–based tools or rating scales, were actually using self–report methods, both performance–based and self–report, or both self–report and rating scale methods; or they used more than one method to measure empathy in one article. For this reason, the number of articles in our categorization is different from the number of total studies, as some studies were eventually included in more than one category (e.g., both self–report and rating scale).

Ultimately, it was decided to organize the results into two different types of methods to measure empathy: Those for which it was clear that they were describing *self–report* methods, and those for which the label *others* would be more appropriate, in that it was not clear what method it was used, or it was simply not a self–report method. This decision was taken because there were not enough studies for each non–self–report method to justify an additional classification category. Within the *self–report* group articles, 64 different methods to measure empathy were found. Within the group of *other* methods, there were 8 different approaches. After calculating the percentage of occurrence of each method out of all studies, we decided to further describe in this article only those tools for which the percentage of occurrence among the retrieved articles was over 1% (see Table 2). Below, a brief description of all these selected instruments follows.

Most widely used methods to measure empathy-self-report

As noted above, the big majority of the found studies were consisted of self–report measurement tools to assess empathy. Out of all the studies of self–report articles, it was chosen to further inspect only those which were over 1%. After calculating the percentage it was seen that in this group enter 14 different instruments. Each of them will be shortly presented below. In Table 3 we present all the instruments that were found in the articles of self–report methods: only the first 14, i.e., those that exceed 1% of occurrence, will be described below.

– *Interpersonal Reactivity Index* (*IRI*; Davis, 1980, 1983). The IRI is a 28–item, self–report instrument to measure different reactions and personal experiences of one individual while observing the other (Davis, 1983). The

Table 2 – Summary of empathy measures and frequency of use among selected articles

Instrument		Times	% all studies (N = 252)
Self–report	IRI	43	17.10%
	Jefferson Scale of Physician Empathy	33	13.10%
	Empathy Quotient	25	9.90%
	Consultation and Relational Empathy	11	4.40%
	Jefferson Scale of Empathy	10	4.00%
	Likert scale	8	3.20%
	QCAE	6	2.40%
	Empathy Concern Scale	5	2.00%
	Jefferson Scale of Patient's Perceptions of Physician Empathy	5	2.00%
	Jefferson Scale of Empathy–Health Profession Students version	5	2.00%
	Empathy–Based Stories	3	1.20%
	Basic Empathy Scale	3	1.20%
	Questionnaire Measure of Emotional Empathy	3	1.20%
	Toronto Empathy Questionnaire	3	1.20%
Other	fMRI activation paradigm	8	3.20%
	EMG	4	1.60%
	Reading the Mind in the Eyes	4	1.60%
	EEG activity	3	1.20%

Note. Times = number of times this instrument was met in the papers.

questions have to be answered on 5–point Likert scale from 1 = "Does not describe me well" to 5 = "Describes me very well" (Davis, 1983; Davis & Oathout, 1987). It was designed to measure different empathic tendencies: a) *Perspective Taking* (PT); b) *Fantasy* (FS); c) *Empathic Concern* (EC); d) *Personal Distress* (PD). Every each of them is made up of seven various items. The homogeneity of the different scales of IRI are quite good, the Cronbach's α coefficients are ranging from .68 to .79. The previous studies also showed that IRI subscales of PT and FS are related to cognitive empathy and that different subscales of this instrument vary in between cognitive and emotional characteristics of empathy in adults with autism (Rogers, Dziobek, Hassenstab, Wolf & Convit, 2007).

– *Jefferson Scale of Physician Empathy* (*JSPE*; Hojat et al., 2001, 2002, 2003). JSPE is a 20–item, self–report questionnaire that measures different components of empathy between physicians in patient–care environment. Questions had to

Table 3 – Percentage of the use of all self–report empathy measures included in this study

Instrument	Times	Percentage	
		Self–report (n = 223)	All studies (N = 252)
IRI	43	19.30%	17.10%
Jefferson Scale of Physician Empathy	33	14.80%	13.10%
Empathy Quotient	25	11.20%	9.90%
Consultation and Relational Empathy	11	4.90%	4.40%
Jefferson Scale of Empathy	10	4.50%	4.00%
Likert scale	8	3.60%	3.20%
QCAE	6	2.70%	2.40%
Empathy Concern Scale	5	2.20%	2.00%
Jefferson Scale of Patient's Perceptions of Physician Empathy	5	2.20%	2.00%
Jefferson Scale of Empathy–Health Profession Students version	5	2.20%	2.00%
Empathy–Based Stories (MES)	3	1.30%	1.20%
Basic Empathy Scale	3	1.30%	1.20%
Questionnaire Measure of Emotional Empathy	3	1.30%	1.20%
Toronto Empathy Questionnaire	3	1.30%	1.20%
The Empathy Scale of the Impulsiveness–Venturesomeness–Empathy Questionnaire	2	.90%	.80%
Scale of Ethnocultural Empathy	2	.90%	.80%
Emotional Empathy Scale	2	.90%	.80%
The Empathy (E) scale	2	.90%	.80%
Interpersonal Reactivity Index for Couples	2	.90%	.80%
Victim Empathy Response Assessment	2	.90%	.80%
Hogan Empathy Scale	2	.90%	.80%
Balanced Emotional Empathy Scale	2	.90%	.80%
Reynolds Empathy Measure	2	.90%	.80%
Empathy Index	2	.90%	.80%
Parental Empathy Measure	2	.90%	.80%
Qualitative Short Survey	2	.90%	.80%
Test of Emotional Perception	1	.40%	.40%
The Perceived Empathic Self–Efficacy Scale	1	.40%	.40%
Global Rating of Empathy scale	1	.40%	.40%
Therapist Empathy Scale	1	.40%	.40%
The Schutte Emotional Intelligence scale	1	.40%	.40%

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Instrument	Times	Percentage	
		Self–report (n = 223)	All studies (N = 252)
Empathy for Pain Scale	1	.40%	.40%
Empathic Tendency Scale	1	.40%	.40%
Fictional IRI	1	.40%	.40%
Empathy for Infant Pain video program	1	.40%	.40%
Affective and Cognitive measure of Empathy	1	.40%	.40%
JSE S–Version	1	.40%	.40%
Empathetic Care Scale	1	.40%	.40%
Empathy Assessment Index	1	.40%	.40%
Toronto Composite Empathy Scale	1	.40%	.40%
Barrett–Lennard empathy subscale	1	.40%	.40%
Quotient of Empathic Abilities	1	.40%	.40%
Scale of Ethnocultural Empathy	1	.40%	.40%
Interaction Response Scale for Palliative Care Nursing	1	.40%	.40%
EMPATHy	1	.40%	.40%
Mehrabian Emotional Empath Scale	1	.40%	.40%
EMPATHIC questionnaire	1	.40%	.40%
Questionnaire Measure of Emotional Empathy	1	.40%	.40%
How I Feel in Different Situations Scale	1	.40%	.40%
Emotional Recognition subscale	1	.40%	.40%
Penner's Prosocial Personality Battery	1	.40%	.40%
Emotional Empathy Tendency scale	1	.40%	.40%
Empathy Response Index	1	.40%	.40%
Empathy for others pain	1	.40%	.40%
Intellectual empathy	1	.40%	.40%
Emotional Perspective–Taking scale	1	.40%	.40%
"Big Three"	1	.40%	.40%
Emotion Specific Empathy questionnaire	1	.40%	.40%
Objective Structured Clinical Examination	1	.40%	.40%
Empathic Communication Coding System	1	.40%	.40%
Empathic Opportunity	1	.40%	.40%
Kiersma–Chen Empathy Scale	1	.40%	.40%
Empathic Accuracy (EA) Task	1	.40%	.40%
Relationship Evaluation Questionnaire (RELATE)	1	.40%	.40%

Note. Times = number of times this instrument was met in the papers

be answered by Likert scale from 1 to 7, where 1 means strongly disagree and 7 means strongly agree and are divided into two types: one half is positively worded and the other one is negatively worded. The higher score on this test a person gets, the higher level of empathy it shows (Yang & Yang, 2013). This instrument is translated into 25 languages so the reliability of it varies, but it is almost always significantly high: Cronbach's α is in the range of .80, the test–re–test reliability coefficient is .65 (Hojat & LaNoue, 2014). In the previous studies, it was found the correlation between IRI and JSPE ($r = .45$, $p<.01$) but it was not significantly high (Hojat, Mangione, Gregory, Kane & Gonnella, 2005).

- *Empathy Quotient* (*EQ*; Baron–Cohen & Wheelwright, 2004). EQ is a 60–item self–report tool to measure empathy. Questions of this questionnaire have to be answered on a scale from 0 to 2, where the higher score means a higher level of empathy. The EQ measures three different factors – *cognitive empathy*, *emotional reactivity* and *social skills* (Lawrence, Shaw, Baker, Baron–Cohen & David, 2004). The Cronbach's α varies from the language the questionnaire is translated to, but more or less is always in the range of .85, so it is significantly quite meaningful (Melchers, Montag, Markett & Reuter, 2015). The test–retest results in previous studies show high temporal stability ($r = .97$, $p<.01$) for all of the items (Melchers et al., 2015). Also, the medium correlation between IRI's *perspective taking* (PT) and *empathic concern* (EC) scales and EQ were found (Melchers et al., 2015). That shows that EQ is very useful to measure cognitive empathy.
- *Consultation and Relational Empathy* (*CARE*; Mercer & Reynolds, 2002). CARE is a self–report 10–item questionnaire that was developed to measure the consultations based on the standardized and generic patient–reported assessment (Wirtz, Boeckerb, Forkmann & Neumann, 2011). It contains 4 different components: emotional, ethical, behavioral and cognitive. The answers had to be chosen in the scale from 1 to 5, where 1 is poor and 5 is excellent (Wirtz et al., 2011). The original version of CARE Cronbach's α is significantly high, the value is .93 (Mercer et al., 2004). The previous studies also showed correlation between CARE and Reynolds Empathy Scale (RES) which was strong ($r = .85$, $p<.001$), and strong correlation between CARE and Barrett–Lennard Empathy Subscale (BLESS) ($r = .84$, $p<.001$) (Mercer et al., 2004).
- *Jefferson Scale of Empathy* (*JSE*; Hojat et al., 2001). JSE is a self–report 20–item instrument that was developed to value empathy in the environment of medical education and the care of the patients. The questionnaire has to be answered by Likert scale of 7 points from strongly disagree (1) to strongly agree (7). JSE is divided into three components: *perspective taking* (that is seen as a very important part of empathy), *compassionate care* (that is seen as an essential level of patient–physician relationship) and the third one is *walking in patient's shoes* (Hojat & LaNoue, 2014). The reliability of JSE is significantly quite high (Cronbach's α value is .8 that varies depending on the language that the questionnaire is translated to, from.7 to.8) (Hojat & LaNoue, 2014)
- *Likert scale R* (Likert, 1932). In this research Likert scale was used in various forms, where the scales varied from 5 to 10 points, and in different contexts. However, there were a few articles where it was explained the type of Likert scale they were using, but not the questionnaire or the instrument to measure empathy. In any case, Likert scale was used as a self–report instrument, to answer the questions that specific authors developed for that study. However, in none of these studies the name of the questionnaire was mentioned. For this reason, there were some doubts on whether to put it together with self–report instruments or to put it together with other instruments to measure empathy. Eventually, it was decided to leave it together with the self–report measurement instruments because it was used to measure personal experienced empathy.
- *The Questionnaire of Cognitive and Affective Empathy* (*QCAE*; Reniers, Corcoran, Drake, Shryane & Vollm, 2011). The QCAE is a self–report, 31–item questionnaire that was developed to measure affective and cognitive empathy (Reniers et al., 2011). Questionnaire consist of two components mentioned before and is divided into five different subscales. The component of cognitive empathy comprises two subscales: a) *Perspective Taking* (that consists 10 items), which lets asses to see how one person is able to see the situation from another person's perspective; b) *Online Simulation* (that consists 9 items), which lets see how another person is able to understand and mentally represent how another person is feeling. Other three subscales measures the affective empathy: a) *Emotion Contagion* (that consists 4 items), which lets see how the person is able to reflect self–oriented emotions while noting the emotional states of others; b) *Proximal Responsivity* (that consists 4 items), which measures one

person's emotional reaction to the moods of another person, who is physically or emotionally close to him; c) *Peripheral Responsivity* (that consists 4 items), which lets to measure people's emotional reaction to the state of moods of another person, who is not close to them or they do not know that person at all. Every subscale has to be measured by the Likert type scale of 4 points (Reniers et al., 2011). The previous studies showed that the inter reliability between QCAE subscales were quite sensible (α's varied between .75 and .91) except of peripheral responsivity response that was lower, α = .42 (Michaels et al., 2014; Reniers et al., 2011). Also, the medium correlations between QCAE and IRI subscales were found. The QCAE cognitive empathy subscales revealed the highest correlations with IRI PT subscale ($r = .63$, $p<.001$), medium correlations with IRI FS and EC subscales ($r = .39$, $p<.05$), and negative correlation with IRI PD subscale ($r = -.33$, $p<.05$) (Michaels et al., 2014).

- *Empathy Concern Scale* (EC; Davis, 1980, 1983). Empathy Concern Scale is one of the 4 subscales in the questionnaire of IRI. Sometimes it is used as a separate instrument but maintains the same characteristics of the main tool. In particular, it measures the ability of the person to express feelings of empathy and concern for other people who are in unfortunate situations (affective empathy). Previous studies showed that the reliability of this scale is not so high – the Cronbach's α is .52 (Leong, Cano, Wurm, Lumley & Corley, 2015).
- *Jefferson Scale of Patient's Perceptions of Physician Empathy* (*JSPPPE*; Hojat et al., 2003). The JSPPPE is a short, self–report tool of 5 items. It is unidimensional scale that measures only one factor: empathic engagement. Response options are given in 5 points Likert scale, where 1 means strongly disagree and 5 means strongly agree. JSPPPE is given for the patients to complete, to measure the empathy of the physicians from the perspective of the patients. The Cronbach's α is .58, which in general is a low result, but considering the fact that this questionnaire has only 5 items, it might be satisfactory. Previous studies showed a very low correlation between JSPPPE and Jefferson Scale of Physician Empathy ($r = .24$, $p = .22$) which was not considered as significantly important (Kane, Gotto, Mangione, West & Hojat, 2007).
- *Jefferson Scale of Empathy–Health Profession Students version* (*JSE–HPS*; Hojat, 2007). JSE–HPS is a self–report questionnaire that was developed to measure the level of empathy between students in healthcare environment. It is a 20–item measuring instrument that is divided into three sub–factors: a) *Perspective Taking*; b) *Compassionate Care* (or emotional engagement); c) *Standing in the Patient's Shoes* (Hojat et al., 2002). It has to be answered in the 7 point Likert scale (1 is strongly disagree, 7 is strongly agree). The Cronbach's α through all the subscales vary between .80 and .89. The previous studies showed that students, whose grades are better, are more likely to have a higher level of empathy (Montanari et al., 2015).
- *Empathy–Based Stories* (*MES*; Eskola, 1998). The MES is a qualitative research method that is used in different fields (i.e. sociology, pedagogy, social psychology). The aim of this instrument is to see different points of view of different people, to see their personal experiences in emotionally heavy situations. This instrument works by giving a participant a sheet of paper with a short story on the top of the paper, those stories might be very different, can be used in different fields and depends on the examiner (Juntunen & Saarti, 2000). After a person gets a paper he has to finish the story that was started on the same paper and can write it only on one side of the sheet. This instrument usually is used in the situation where the opinion of the participant is very important (for example, when an institution wants to improve their offered services). This instrument is useful because a person is completely free to write everything he wants: his observations on the situation mentioned in the paper, can concentrate on the future and give his honest opinion (positive or negative) or emotions, and can choose the highlights of the situation. To analyze the data of this instrument, matrixes are used. In every study, where this measurement is used, matrixes are different, so it depends completely on the examiner what he wants to test or improve (Juntunen & Saarti, 2000). The very important factor using this measure tool is that in certain situations, the self–esteem of the person does influence on the results. The more he/she is confident, the better stories can be written. Sometimes, when MES is used in one certain area it can be useful to bring some people who do not have anything in common with the area to write stories. It can be very helpful when analyzing the results.
- *Basic Empathy Scale* (*BES*; Jolliffe & Farrington, 2006). BES is a self–report 20–items instrument which was developed to measure affective and cognitive empathy. The questionnaire is divided into two types of subscales: 9–item *Cognitive Empathy Subscale* (which measures the understanding

of other people's emotions – a person understands why another person is happy) and 11–item *Affective Empathy Scale* (which measures the emotional part of the person – an individual becomes sad while watching a sad movie). Each item from both subscales has to be answered by a Likert type scale of 5 points, the higher number of points means a higher level of empathy. The Cronbach's α for the affective empathy subscale is .81, and for the cognitive empathy subscale it is .84. Also, it has shown a good model fit (Baldner & McGinley, 2014). Previous studies have shown that the correlation between an Affective Empathy Subscales of BES and Interpersonal Reactivity Index are higher (r = .51 – .64) than Cognitive Empathy Subscales (r = .31 – .49) (Baldner & McGinley, 2014).

- *Questionnaire Measure of Emotional Empathy* (*QMEE*; Mehrabian & Epstein, 1972). The QMEE is a self–report measurement tool that was developed to measure emotional empathy. It is a 33–item instrument that has to be answered by a 9 point ratings from –4 to 4, where –4 means a strong disagreement and +4 means a strong agreement. QMEE has 7 subscales: a) *vulnerability to emotional contamination*; b) *appreciation of the feelings of others that a person does not know*; c) *strong emotional response*; d) *tendency to be emotionally touched by other people positive emotional capabilities*; e) *tendency to be emotionally touched by other people negative emotional capabilities*; f) *sympathetic capacities*; g) *wish to be in contact with people that have problems* (Mehrabian & Epstein, 1972). The reliabilities of the subscales are fair to adequate – the Cronbach's αs vary from .63 to .80 (Lyons & Hazler, 2002).
- *Toronto Empathy Questionnaire* (*TEQ*; Spreng et al., 2009). TEQ is a self–report instrument that was developed to measure different types of empathy. It is a 16–item measure that has only one empathy scale (just like empathy quotient) (Baldner & McGinley, 2014). It has to be answered by a Likert type scale of 5 points, where more points mean a higher level of empathy. This instrument has equal number of positively and negatively warded items (so when the item is warded negatively, the response to it has to be also reversed). It was also proven that TEQ is a good model fit (Baldner & McGinley, 2014) and its reliability is adequate (Cronbach's α is .88). Previous studies found that there is a positive correlation between TEQ and IRI *Empathic Concern Scale* (r = .74, p<.001), also, a low correlation between TEQ and IRI *Perspective Taking* was found (r = .35, p<.001) (Baldner & McGinley, 2014).

Most wieldy used methods to measure empathy: other

As it was explained before, we created the category other that includes performance based or rating scales methods for the empathy assessment, because we found few methods that measure empathy in a different way from self–report questionnaire. Furthermore, for the self–report category, we decided to describe only the instruments that were present in the studies over the 1%. However, the total number of the instruments present in the other category is 8, as it can be seen in Table 4. So, because they are a few number of tools, we decided to describe all the instruments present in this group.

- f*MRI activation paradigm* (Vollm et al., 2006). The fMRI activation paradigm is used to expose activation areas related with empathy processing. It is a visual activation paradigm, which consist of a series of cartoons (which represent different short stories in every block of pictures). The cartoons can contain a two type stories – Physical and Empathy. At the beginning of this procedure, a series of questions are given to participants (that helps to see the same mental construct corresponding in all participants). The scenarios of each series are made that the characters of cartoons continue their story in upcoming pictures. Because of this reason, a participant has to be empathizing for the protagonist of the story. The questions contain a text asking about what a person thinks will happen next in the picture, or what s/he thinks that the protagonist of the cartoon is feeling at that particular moment. Each of the blocks (two pictures telling the same story at the time) is shown for only four seconds in the upper part of the screen, then, for other four seconds, the possible endings of that story (other two pictures) are shown at the bottom part of the screen. The participant has to choose the answer to the question that is given before, and only one of the two possibilities is right. It is considered, that more correct answers a person gives, a higher level of empathy it has; also, by doing fMRI study, it is seen which part of the brain is active while doing a part regarding empathy (Kim et al., 2010).
- *Electromyography* (EMG). This instrument is used to capture the electrical activity of facial muscles, because it is believed that facial muscle reactions are related to emotional reactions (Ekman & Friesen, 1975; Tomkins, 1991). The intention of this tool is to catch all the facial reaction in the face–to–face situations. Moreover, the time of the reaction is also important: faster a person shows

Table 4 – Percentage of the use of all Other empathy measures inlcuded in this study

	Times	% in Other (n = 31)	% in All studies (N = 252)
fMRI activation paradigm	8	25.80%	3.20%
EMG	4	12.90%	1.60%
Reading the Mind in the Eyes Test	4	12.90%	1.60%
EEG activity	3	9.70%	1.20%
Performance–Based Measure of Empathy	2	6.50%	.80%
Multifaceted Empathy Test	2	6.50%	.80%
Story–Based Empathy Task	1	3.20%	.40%
Social Relations Model	1	3.20%	.40%

Note. Times = number of times this instrument was met in the papers.

his reaction, a better understanging of other's feelings are considered that the person has. However, in the previous studies it was found that reactions can be learned or controlled by the person, so it is not always a good way to measure empathic responses (Sonnby–Borgstrom, Jonsson & Svensson, 2003).

– *Reading the Mind in the Eyes Test* (*RMET*; Baron–Cohen et al., 1997). The RMET is a performance based instrument that was developed to assess the ability of the person to read another person's emotions based on only looking to the line pictures of the eyes. This tool lets to see and measure the mental states of oneself and others. It contains 36 pictures of the eyes, that represents different emotions, the person is instructed to choose one out of four offered words (that describes different emotions), that they personaly think signifies the current emotion in the photo. This measure is usually used with people who has Asperger Syndrome, as they have major difficulties on recognizing the emotions of other people. The medium response for this test is 26.2, or 21.9 for people with Asperger Syndrome or High–functioning Autism. A notable issue about this test is that the words given to choose from might be not clear or familiar to the person, so that also might be a consequence of the lower result. The previous studies have showed that no correlation exist between RMET and IQ ($r = .09$, $p = .6$) (Baron–Cohen, Whellwright, Hill, Raste & Plumb, 2001).

– *Electroencephalography* (EEG) activity. The EEG method is an instrument that helps to see the different level of empathy in different people, as EEG responses vary by doing requested task while being recorded. This method works by showing different types of pictures on the computer to the participant. After he is attached to EEG apparatus, it is recorded by doing this protocol: a) for 3 minutes the person is recorded in the resting state with his eyes closed; b) different pictures that induce positive emotions are shown on the computer screen for 1,5 minutes; c) different pictures with neutral stimuli are shown for one and a half minutes; d) erotically colored pictures are shown for 1,5 minutes; e) pictures inducing negative stimuli are shown for another one and a half minutes; f) lastly, the EEG is recorded again in the resting state for 3 minutes with the eyes closed. In between of each series some grey–colored pictures with meaningless context are presented for 1,5 minutes. After that EEG was recorded a participant is asked to value every block

of pictures that they have seen before by the scales of 9 points (the one that gave most pleasure, that were neutral, positive, most unpleasant or erotic). Then it is asked to value the pictures in the same way that were maximally activating, most calming or neutral. Persons that received most points on emotionally active pictures were considered that are more empathic than those who got lower scores. Also, by doing EEG measure, it is possible to see which part of the brain activates when a person watches different pictures that represent different stimuli (Demidova, Dubovik, Kravchenko & Makarchouk, 2014).

- *Performance–Based Measure of Empathy* (Derntl et al., 2009). The Performance–Based Measure of Empathy is a tool of three tasks that a person has to take on a computer, which includes: a) facial affect perception; b) affective responsiveness; c) emotional perspective taking. Tasks are time registered (the reaction time is one of the measure of the test), and the two forced–choice responces are given, so an accuracy of the responces are also considered (Derntl et al., 2009). A person has to recognize the emotion in the shown picture and choose the answer as fast as possibile, the less time it takes and the better accuracy a person gets, a higher level of empathy and higher understanding about emotional states of other person is considered that the participant has (Derntl et al., 2009).
- *Multifaceted Empathy Test* (*MET*; Dziobek & Heekeren, 2008). The MET is a rating scale type of instrument to measure cognitive and affective empathy. It consist of different series of the photographs, where mostly people are in emotionally stimulating situations. In the part of the test where the cognitive empathy is measured, it is asked for a person to try to name the mental states of the persons who are in the given photographs. After this part a person is informed about the correct answers that he gave. Later on, to measure the emotional empathy, it is asked for the participants to rate their personal emotional reactions that they experience while looking in to the given pictures. The MET consists of 23 pairs of different pictures (that involves one context and one person picture), while looking to those pictures an individual is asked some questions (Dziobek & Heekeren, 2008). For the pictures that consists a context, a person is asked to rate his level of excitement by using *Self–Assessment Manikin* (*SAM*; Lang et al., 1997). It is a visual–analogue scale that has a rating scale from 0 to 9 (0 = very calm; 9 = very excited). For the cognitive part of the test, a participant is asked to name the mental states in depicted persons, which they have to choose one out of four given in the test. The reliability of the MET varies from medium to high: Cronbach's α ranges from .71 to .92. Moreover, the correlations between MET cognitive empathy and IRI *Perspective Taking* scales were found ($r = .28$, $p<.01$), but were not significantly meaningful, and the correlation between MET affective empathy and IRI *Empathic Concern* ($r = .63$, $p<.01$) were found (Dziobek & Heekeren, 2008).
- *Story–Based Empathy Task* (*SET*; Dodich et al., 2015). SET is a non verbal task that was developed to measure an intention and emotion acknowledgment. This task is based on original cartoons, it takes about 15–20 minutes to accomplish this test and is consisted of two main experimental conditions and one control condition (Dodich et al., 2015). The main conditions are: a) identifying intentions (SET–IA); b) emotional states (SET–EA); the control condition is the inference of causality reaction (SET–CI) that is based on the personal knowledge of the individual of physical properties of objects and human bodies (Dodich et al., 2015, p.1908). Each of these conditions are composed of six pictures and then it is asked to choose a possible ending for that story given in the pictures (but the possible endings are given only later). Each of the parts can be valued maximum of 6 points (1 point per every correct choice), so the total score and the best possible task performance is 18 points. More points a participant gets, higher level of understanding about other's feelings it is considered that he has (Dodich et al., 2015).
- *Social Relations Model* (*SRM*; Kenny & La Voie, 1988). SRM is a rating scale type of measure that was developed to describe dyadic relationships when the components are assessed on a continuous scale. SRM is divided into three components: a) perceiver (helps to understand how the participant sees other people); b) target (helps to understand how the person itself is seen by other people); c) relationship (helps to understand how a perceiver sees the target) (Kenny, Mohr & Levesque, 2001). Two ways to use this model can be used – round robin or block. Round robin is a way that is mostly used in interpersonal perception studies (every member of the group has to rate or judge every other person in the group). The results of round robin are calculated by using the computer program SOREMO. Another way of the model is block (a group is divided into two smaller subgroups, and each person from each subgroup has to rate or judge every person from other subgroup). SRM

is an instrument that helps a participant to understand, if other people do understand his emotions and helps to see, if a participant itself understands other individual's emotions (Kenny et al., 2001).

CONCLUSIONS

Despite the increasing interest in the construct of empathy, both from a clinical and from a research perspectives, the literature describing different methods to measure empathy is not well organized. To facilitate the work of researchers and practitioners willing to measure empathy, the current article describes the most frequently utilized instruments available to date. The results of our literature search showed that the most popular ways to measure empathy are self–report style instruments (e.g., IRI, Jefferson's Scale of Empathy, Empathy Quotient). This result is not too surprising, given that self–reports are easy to use, faster to analyze and often produce valid and reliable scores. On the other hand, it should be noted that self–report are subject to social desirability, and it is controversial to ask a person to evaluate his or her empathetic abilities, given that people with poor empathetic skills are likely to not be aware about their ability to perceive, understand and share the emotional states of the others. In line with this position, a number of other methods to measure empathy were also found (e.g., fMRI paradigm).

Like all studies, this literature review is also not without limitations. Firstly, we mainly relied on the titles of the articles (although we also read the abstract and the full text of all of the selected articles). In the future studies, by adding abstracts and key–words it might be that some additional information could be found. Furthermore, in the future studies it might be considered to use different key–words, because it is not possible to check if the key–words that were used in this study were exhaustive. Likewise, future studies might inspect older articles. Also, the most popular instrument between other type of measurements was fMRI, which is not actually a measurement tool that can exactly measure a level or type of empathy, which would be useful in the field of clinical psychology. Lastly, comparing the frequency of citation of each of these measures may not be the best approach to identify which instruments are actually the most used ones, or can be considered as the best ones to use to measure empathy. For example, if an instrument was developed long time ago, but then it got discarded because it was not very good to measure empathy, our review would probably still list that instrument as one of the most cited ones. Moreover, in this article it is possible to recognize which instrument is good for the assessment of both types of empathy, which is good for the affective one (e.g. the implicit variables) and which is better for the cognitive one; however, our review does not suggest whether some measuring instruments are better for one professional or another. It represents the overall view of all possible tools that are available, by describing the positive and negative sides of it, but it is up to the professional to decide whether to use one instrument or another. For example, self–report measures can be very successfully used as the tool to assess empathy as a trait, where other types of instruments can be used better in situations where the valuation of other people is needed. This study can help researchers to choose an instrument, as he/she has a full view of what is out there. However, even if this article is useful to provide an overall view of most used instruments, it does not provide an organized literature that is able to inform any professionals on what measure is suitable for his/hers work.

Despite these limitations, our study still has a merit to be the first one to organize the literature on empathy measures by the most used ones in the last fifteen years. Instruments to measure empathy and statistical usage of them were never presented together and grouped like this in one study before. The aim of this study was also to summarize all the instruments that are given during last 15 years, especially for the researchers that are willing to investigate empathy capabilities. This literature review might be useful for those who are exploring empathy and are searching for new types of instruments to measure it.

References

BALDNER, C. & McGINLEY, J.J. (2014). Correlational and exploratory factor analyses (EFA) of commonly used empathy questionnaires: New insights. *Motivation and Emotion*, *38* (5), 727–744.

BARON–COHEN, S., WHELLWRIGHT, S., HILL, J., RASTE, Y. & PLUMB, I. (2001). The "Reading the Mind in the Eyes Test revised version: A study with normal adults, and adults with Asperger Syndrom or High–functioning Autism. *Journal of Child Psychology*, *42* (2), 241–251.

BATSON, C.D., AHMAD, N. & STOCKS, E.L. (2004). Benefits and liabilities of empathyinduced altruism. In A.G. Miller (Ed.), *The social psychology of good and evil*. New york: Guilford Press.

BORG, M.B. Jr., BRENNER, G.H. & BERRY, D. (2014). A New Understanding of Compassionate Empathy. *Psychology today*.

CORNELL, A.H. & FRICK, P.J. (2007). The moderating effects of parenting styles in the association between behavioral inhibition and parent–reported guilt and empathy in preschool children. *Journal of Clinical Child and Adolescent Psychology*, *36*, 305–318.

DAVIS, M.H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, *44* (1), 113–126.

DAVIS, M.H. & OATHOUT, H.A. (1987). Maintenance of satisfaction in romantic relationship: Empathy and relational competence. *Journal of Personality and Social Psychology*, *53*, 397–410.

DECETY, J. & LAMM, C. (2006). Human empathy through the lens of social neuroscience. S*cientific World Journal*, *6*, 1146–1163.

DEMIDOVA, K.Y., DUBOVIK, V.V., KRAVCHENKO, V.I. & MAKARCHOUK, N.E. (2014). EEG Activity during Viewing of Neutral and Emotionally Colored Pictures by Men and Women with Different Levels of Empathy. *Neurophysiology*, *46* (2).

DERNTL, B., FINKELMEYER, A., TOYGAR, T.K., HULSMANN, A., SCHNEIDER, F., FALKENBERG, D.I. & HABEL, U. (2009). Generalized deficit in all core components of empathy in schizophrenia. *Schizophrenia Research*, *108* (1–3), 197–206.

DE WAAL, F.B.M. (2009). Putting altruism back into altruism: The evolution of empathy. *Annual Review of Psychology,* 59, 279–300.

DODICH, A., CERAMI, C., CANESSA, N., CRESPI, C., IANNACCONE, S., MARCONE, A., REALMUTO, S., LETTIERI, G., PERANI, D. & CAPPA, S.F. (2015). A novel task assessing intention and emotion attribution: Italian standardization and normative data of the Story–based Empathy Task. *Neurological Science*, *36*, 1907–1912.

DZIOBEK, I. & HEEKEREN, H.R. (2008). Dissociation of cognitive and emotional empathy in adults with Asperger syndrome using the Multifaceted Empathy Test (MET). *Journal of Autism and Developmental Disorders*, *38* (3), 464–473.

EKMAN, P. & FRIESEN, W.V. (1975). *Unmasking the Face*. Englewood Cliffs, New Jersey: Spectrum–Prentice Hall.

GOLEMAN, D. (2007). *Three kinds of empathy: Cognitive, Emotional, Compassionate*. http://www.danielgoleman.info/three–kinds–of–empathy–cognitive–emotional–compassionate/

GRUHN, D., REBUCAL, K., DIEHL, M., LUMLEY, M. & LABOUVIE–VIEF, G. (2008). Empathy across the adult lifespan: Longitudinal and experience–sampling fndings. *Emotion*, *8*, 753–765.

HOJAT, M., GONNELLA, J.S., MANGIONE, S., NASCA, T.J., VELOSKI, J.J., ERDMANN, B., CALLAHAN, C.A. & MAGEE, M. (2002). Empathy in medical students as related to academic performance, clinical competence and gender. *Medical Education*, *36*, 522–527.

HOJAT, M., MANGIONE, S., GREGORY, C., KANE, G.C. & GONNELLA, J.S., (2005). Relationships between scores of the Jefferson Scale of Physician Empathy (JSPE) and the Interpersonal Reactivity Index (IRI). *Medical Teacher*, *27*, 625–628.

HOJAT, M. & LaNOUE, M. (2014). Exploration and confirmation of the latent variable structure of the Jefferson scale of empathy. *International Journal of Medical Education*, *5*, 73–81.

JUNTUNEN, A. & SAARTI, J. (2000). Library as the Student's Cornerstone or Obstacle: Evaluating the Method of Empathy–Based Stories. *Libri*, *50*, 235–240.

KANE, G.C., GOTTO, J.L., MANGIONE, S., WEST, S. & HOJAT, M. (2007). Jefferson Scale of Patient's Perceptions of Physician Empathy: Preliminary Psychometric Data. *Croat Med J.*, *48*, 81–86.

KENNY, D.A., MOHR, C.D. & LEVESQUE, M.J. (2001). A Social relations variance partitioning of dyadic behavior. *Psychological Bulletin*, *127* (1), 128–141.

KIM, Y.T., LEE, J.J., SONG, H.J., KIM, J.H., KWON, D.H., KIM, M.N., YOO, D.S., LEE, H.J. & CHANG, Y. (2010). Alterations in cortical activity of male methamphetamine abusers performing empathy task: fMRI study. *Human Psychopharmacology*, *25*, 63–70.

LAWRENCE, E.J., SHAW, P., BAKER, D., BARON–COHEN, S. & DAVID, A.S. (2004). Measuring empathy: Reliability and validity of the empathy quotient. *Psychological Medicine: A Journal of Research in Psychiatry and the Allied Sciences*, *34* (5), 911–919.

LEONG, L.E.M., CANO, A., WURM, L.H., LUMLEY, M.A. & CORLEY, A.M. (2015). A perspective–taking manipulation leads to greater empathy and less pain during the cold pressor task. *The*

Journal of Pain, *16* (11), 1176–1185.

LYONS, C. & HAZLER, R.J. (2002). The influence of student development level on improving counselor student empathy. *Counselor education and supervision*, *42*.

MARTIN, G.B. & CLARK, R.D. (1982). Distress crying in neonates: Species and peer specificity. *Developmental Psychology*, *18*, 3–9.

MEHRABIAN, A. & EPSTEIN, N. (1972). A measure of emotional empathy. *Journal of Personality*, *40* (4), 525–543.

MELCHERS, M., MONTAG, C., MARKETT, S. & REUTER, M. (2015). Assessment of empathy via self–report and behavioural paradigms: Data on convergent and discriminant validity. *Cognitive Neuropsychiatry*, *20* (2),157–71.

MERCER, S.W., MAXWELL, M., HEANEYD, D. & WATT, G. (2004a). The consultation and relational empathy (CARE) measure: Development and preliminary validation and reliability of an empathy–based consultation process measure. *Oxford Journals Medicine & Health Family Practice*, *21* (6), 699–705.

MERCER, S.W., McCONNACHIE, A., MAXWELL, M., HEANEYD, D. & WATT, G. (2004b). Relevance and practical use of the Consultation and Relational Empathy (CARE) Measure in general practice. *Oxford JournalsMedicine & Health Family Practice*, *22* (3), 328–334.

MICHAELS, T.M., HORAN, W.P., GINGERA, E.J., MARTINOVICHA, Z., PINKHAMD, A.E. & SMITH, M.J. (2014). Cognitive empathy contributes to poor social functioning in schizophrenia: Evidence from a new self–report measure of cognitive and affective empathy. *Psychiatry Research*, *220* (3), 803–810.

MONTANARI, P., PETRUCCI, C., RUSSO, S., MURRAY, I., DIMONTE, V. & LANCIA, L. (2015). Psychometric properties of Jefferson Scale of Empathy–Health Professional Student's version: An Italian validation study with nursing students. *Nursing and health sciences*, *17*, 483–491.

O'BRIEN, E., KONRATH, S.H., GRUHN, D. & HAGEN, A.L. (2012). Empathic concern and perspective taking: Linear and quadratic effects of age across the adult life span. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*. doi:10.1093/geronb/gbs055.

RENIERS, R., CORCORAN, R., DRAKE, J., SHRYANE, N. & VOLLM, B. (2011). The QCAE: A questionnaire of cognitive and affective empathy. *Journal of Personality Assessment*, *93* (1), 84–95.

ROGERS, K., DZIOBEK, I., HASSENSTAB, J., WOLF, O.T. & CONVIT, A. (2007). Who cares? Revisiting empathy in Asperger syndrome. *Journal of Autism and Developmental Disorders*, *37* (4), 709–715.

SONNBY–BORGSTROM, M., JONSSON, P. & SVENSSON, O. (2003). Emotional empathy as related to mimicry reactions at different levels of information processing. *Journal of Nonverbal Behavior*, *27* (1), 3–23.

TOMKINS, S. (1991). *Affect, imagery and consciousness*. New York: Springer Publishing Company.

WELLMAN, H.M., CROSS, D. & WATSON, J. (2001). Meta–analysis of theory–of–mind development: The truth about false belief. *Child Development*, *72*, 655–684.

WIRTZ, M., BOECKERB, M., FORKMANN, T. & NEUMANN, M., (2011). Methodology in health communication research evaluation of the "Consultation and Relational Empathy" (CARE) measure by means of Rasch–analysis at the example of cancer patients. *Patient Education and Counseling*, *82* (3), 298–306.

YANG, K.T. & YANG, J.H. (2013). A study of the effect of a visual arts–based program on the scores of Jefferson scale for physician empathy. *BMC Medical Education*, *13*, 142.

ZAHN–WAXLER, C., ROBINSON, J.L. & EMDE, R.N. (1992). The development of empathy in twins. *Developmental Psychology*, *28*, 1038–1047.

ZILLMANN, D. (1991). Empathy: Affect from bearing witness to the emotions of others. In J. Bryant & D. Zillmann (Eds.), *Communication. Responding to the screen: Reception and reaction processes*. Hillsdale, NJ: Lawrence Erlbaum Associates.

APPENDIX I

The list of key–words that were used to look for measurements of empathy

A

Amount

Assess

Assessing

Assessment

D

Degree

Detect

Detecting

Detection

E

Evaluate

Evaluating

Evaluation

Exam

Examination

Examining

F

Function

Functioning

I

Identify

Identifying

Index

Inspect

Inspecting

Inspection

Instrument

Interview

L

Level

M

Marker

Measure

Measuring

P

Performance

Q

Questionnaire

Quotient

R

Rating

S

Scale

Score

Scoring

Self–report

Survey

T

Task

Test

Testing

Tool

APPENDIX II

The list of studies that were used to find instruments that measure empathy

AUSTIN, E.J., EVANS, P., MAGNUS, B. & O'HANLON, K. (2007). A preliminary study of empathy, emotional intelligence and examination performance in MBChB students. *Medical Education*.

ABRAMOWITZ, A.C., GINGER, E.J., GOLLAN, J.K. & SMITH, M.J. (2014). Empathy, depressive symptoms, and social functioning among individuals with schizophrenia. *Psychiatry Research*.

ACHIM, A.M., OUELLET, R., ROY, M.A. & JACKSON, P.L. (2011). Assessment of empathy in first-episode psychosis and meta-analytic comparison with previous studies in schizophrenia. *Psychiatry Research*.

ADRIAANSEN, M., VAN ACHTERBERG, T. & BORM, G. (2008). The usefulness of the staff-patient interaction response scale for palliative care nursing for measuring the empathetic capacity of nursing students. *Journal of Professional Nursing*.

AHRWEILER, F., SCHEFFER, C., ROLING, G., GOLDBLATT, H., HAHN, E.G. & NEUMANN, M. (2014). Clinical practice and self-awareness as determinants of empathy in undergraduate education: A qualitative short survey at three medical schools in Germany. *Klinische Praxis Und Selbstwahrnehmung Als Einflussfaktoren von Empathie Im Medizinstudium: Eine Qualitative Kurzumfrage an Drei Deutschen Universitäten*.

AINLEY, V., MAISTER, L. & TSAKIRIS, M. (2015). Heartfelt empathy? No association between interoceptive awareness, questionnaire measures of empathy, reading the mind in the eyes task or the director task. *Frontiers in Psychology*.

ARONSON, L. (2014). Examining empathy. *The Lancet*.

AUSTIN, E.J., EVANS, P., MAGNUS, B. & O'HANLON, K. (2007). A preliminary study of empathy, emotional intelligence and examination performance in MBChB students. *Medical Education*.

BAILEY, P.E., HENRY, J.D. & VON HIPPEL, W. (2008). Empathy and social functioning in late adulthood. *Aging & Mental Health*.

BALCONI, M. & BORTOLOTTI, A. (2012). Detection of the facial expression of emotion and self-report measures in empathic situations are influenced by sensorimotor circuit inhibition by low-frequency rTMS. *Brain stimulus*.

BALCONI, M. & BORTOLOTTI, A. (2012). Empathy in cooperative versus non-cooperative situations: The contribution of self-report measures and autonomic responses. *Applied Psychophysiology and Biofeedback*.

BALCONI, M. & BORTOLOTTI, A. (2014). Self-report, personality and autonomic system modulation in response to empathic conflictual versus non conflictual situation. *Cognitive Emotions*.

BALCONI, M. & BORTOLOTTI, A. (2014). Self-report measures, facial feedback, and personality differences (BEES) in cooperative vs. noncooperative situations: Contribution of the mimic system to the sense of empathy. *Cognitive Emotions*.

BALCONI, M. & CANAVESIO, Y. (2013). Emotional contagion and trait empathy in prosocial behavior in young people: The contribution of autonomic (facial feedback) and balanced emotional empathy scale (BEES) measures. *Journal of Clinical Neuropsychology*.

BALCONI, M. & CANAVESIO, Y. (2013). High-frequency rTMS improves facial mimicry and detection responses in an empathic emotional task. *Neuroscience*.

BALTEŞ F.R. & MIU, A.C. (2014). Emotions during live music performance: Links with individual differences in empathy, visual imagery, and mood. *Psychomusicology: Music, Mind and Brain*.

BARON-COHEN, S. & WHEELWRIGHT, S. (2004). The empathy quotient: An investigation of adults with asperger syndrome or high functioning autism, and normal sex differences. *Journal of Autism and Developmental Disorders*.

BASS, E.C., STEDNITZ, S.J., SIMONSON, K., SHEN, T. & GAHTAN, E. (2014). Physiological stress reactivity and empathy following social exclusion: A test of the defensive emotional analgesia hypothesis. *Social Neuroscience*.

BERG, K., BLATT, B., LOPREIATO, J., JUNG, J., SCHAEFFER, A., HEIL, D., OWENS, T., CARTER-NOLAN, P.L., BERG, D., VELOSKI, J., DARBY, E. & HOJAT, M. (2015). Standardized patient assessment of medical student empathy: Ethnicity and gender effects in a multi-institutional study. *Academical medicine*.

BERTHOZ, S., WESSA, M., GAYANNEE, K., WICKER, B. & GRÈZES, J. (2008). Cross-cultural validation of the empathy quotient in a french-speaking sample. *Canadian Journal of Psychiatry.*

BIKKER, A.P., FITZPATRICK, B., MURPHY, D. & MERCER, S.W. (2015). Measuring empathic, person-centred communication in primary care nurses: Validity and reliability of the Consultation and Relational Empathy (CARE) Measure. *BMC Fam Pract*.

BIKKER, A.P., MERCER, S.W. & COTTON, P. (2012). Connecting, Assessing, Responding and Empowering (CARE): A universal approach to person-centred, empathic healthcare encounters. *Educ Prim Care*.

BILLIMEK, J., GUZMAN, H. & ANGULO, M.A. (2015). Effectiveness and feasibility of a software tool to help patients communicate with doctors about problems they face with their medication regimen (EMPATHy): Study protocol for a randomized controlled trial. *Trials*.

BYLUND, C.L. & MAKOUL, G. (2005). Examining empathy in medical encounters: An observational study using the empathic communication coding system. *Health Commun*.

BOUDJEMAD, V. & GANA, K. (2009). Ageism: Adaptation of the Fraboni of Ageism Scale-Revised to the French language and testing the effects of empathy, social dominance orientation and dogmatism on ageism. *Can J Aging*.

BRAUN, S., ROSSEEL, Y., KEMPENAERS, C., LOAS, G. & LINKOWSKI, P. (2015). Self-report of empathy: A shortened french adaptation of the Interpersonal Reactivity Index (IRI) using two large Belgian samples. *Psychol Rep.*

BROOK, M. & KOSSON, D. (2013). Impaired cognitive empathy in criminal psychopathy: Evidence from a laboratory measure of empathic accuracy. *Journal of Abnormal Psychology*.

BUSBY, D. & GARDNER, C. (2008). How do I analyze thee? Let me count the ways: Considering empathy in couple relationships using self and partner ratings. *Family Process*.

CACI, H., NADALET, L., BAYLÉ, F.J., ROBERT, P. & BOYER, P. (2003). Cross-cultural study of the Impulsiveness-Venturesomeness-Empathy questionnaire (IVE-7). C*omprehensive Psychiatry Empathy theory and practice: A survey of psychologists and counselors*.

CARLOZZI, A., LAWRENCE, B., RAY, K. & BARNES, L. (2002). Empathy theory and practice: A survey of psychologists and counselors. *The Journal of Psychology*.

CARRÉ, A. (2013). The Basic Empathy Scale in Adults (BES-A): Factor structure of a revised form. *Psychological Assessment*.

CHEN, D.C., PAHILAN, M.E. & ORLANDER, J.D. (2010). Comparing a self-administered measure of empathy with observed behavior among medical students. *J Gen Intern Med*.

CHRYSIKOU, E.G. & THOMPSON, W.J. (2015). Assessing medical student empathy in a family medicine clinical test: Validity of the CARE measure. *Assessment*.

CHRYSIKOU, E.G. & THOMPSON, W.J. (2016). Assessing Cognitive and Affective Empathy Through the Interpersonal Reactivity Index: An Argument Against a Two-Factor Model. *Assessment*.

CHU, C.I. & TSENG, C.C. (2013). A survey of how patient-perceived empathy affects the relationship between health literacy and the understanding of information by orthopedic patients? *BMC Public Health*.

CICCHETTI, D. & MISAKI, N. (2014). Empathy as a "risky strength": A multilevel examination of empathy and risk for internalizing disorders. *Development and Psychopathology*.

CLIFFORDSON, C. (2002). The hierarchical structure of empathy: dimensional organization and relations to social functioning. *Scand J Psychol*.

COLLINS, K., GRATTON, C., HENEAGE, C. & DAGNAN, D. (2015). Employed carers' empathy towards people with intellectual disabilities: The development of a new measure and some initial theory. *J Appl Res Intellect Disabil*.

CORRADINI, A. & ANTONIETTI, A. (2013). Mirror neurons and their function in cognitively understood empathy. *Conscious Cogn*.

CONRAD, B. & MCGINLEY, J. (2014). Correlational and Exploratory Factor Analyses (EFA) of commonly used empathy questionnaires: New insights. *Motivation and Emotion*.

CRANDALL, S.J. & MARION, G.S. (2009). Commentary: Identifying attitudes towards empathy. An essential feature of professionalism. *Acad Med*.

CROMIE, T.R. (2015). Jane Addams and the "devil baby tales": The usefulness of perplexity in "sympathetic understanding," a tool in learning empathy. *J Am Psychoanal Assoc.*

CURWEN, T. (2003). The importance of offense characteristics, victimization history, hostility, and social desirability in assessing empathy of male adolescent sex offenders. *Sex Abus*e.

CUSI, A., MacQUEEN, G.M., McKINNON, M.C. (2010). Altered self-report of empathic responding in patients with bipolar disorder. *Psychiatry Res*.

DAVIDSON, J.H. (2014). Empathy and integrative thinking: Talmudic paradigms for the essentials of a medical interview. *Med Humanit*.

de BARROS, D.M., DIAS, A.M., SERAFIM, A.P., CASTELLANA, G.B., ACHÁ, M.F. & BUSATTO, G.F. (2013). Dimensional assessment of psychopathy and its relationship with physiological responses to empathic images in juvenile offenders. *Front Psychiatry.*

DECKER, S.E., NICH, C., CARROLL, K.M. & MARTINO, S. (2014). Development of the Therapist Empathy Scale. *Behavioural and Cognitive Psychotherapy*.

DEMIDOVA, K.Y., DUBOVIK, V., KRAVCHENKO, I. & MAKARCHOUK, N. (2014). EEG activity during viewing of neutral and emotionally colored pictures by men and women with different levels of empathy. *Neurophysiology*.

DENCKLA, C.A., FIORI, K.L. & VINGERHOETS, A.J. (2014). Development of the Crying Proneness Scale: Associations among crying proneness, empathy, attachment, and age. *J Pers Assess*.

DERNTL, B., FINKELMEYER, A., EICKHOFF, S., KELLERMANN, T., FALKENBERG, D.I., SCHNEIDER, F. & HABEL, U. (2010). Multidimensional assessment of empathic abilities: Neural correlates and gender differences. *Psychoneuroendocrinology*.

DEVLIN, H.C., ZAKI, J., ONG, D.C. & GRUBER, J. (2014). Not as good as you think? Trait positive emotion is associated with increased self-reported empathy but decreased empathic performance. *PLoS One*.

DI GIUNTA, L. & KUPFER, A. (2010). Assessing perceived empathic and social self-efficacy across countries. *European Journal of Psychological Assessment*.

DI LILLO, M., CICCHETTI, A., LO SCALZO, A., TARONI, F. & HOJAT, M. (2009). The Jefferson Scale of Physician Empathy: Preliminary psychometrics and group comparisons in Italian physicians. A*cad Med*.

DI ROSA, E., SORARÙ, G., KLEINBUB, J.R., CALVO, V., VALLESI, A., QUERIN, G., MARCATO, S., GRASSO, I. & PALMIERI, A. (2015). Theory of mind, empathy and neuropsychological functioning in X-linked spinal and bulbar muscular atrophy: A controlled study of 20 patients. *J Neurol*.

DODICH, A., CERAMI, C., CANESSA, N., CRESPI, C., IANNACCONE, S., MARCONE, A., REALMUTO, S., LETTIERI, G., PERANI, D. & CAPPA, S.F. (2015). A novel task assessing intention and emotion attribution: Italian standardization and normative data of the Story-based Empathy Task. *Neurol Sci*.

DUAN, C. & KIVLIGHAN, D.M. (2002). Relationships among therapist presession mood, therapist empathy, and session evaluation. *Psychother Res.*

DZIOBEK, I., ROGERS, K., FLECK, S., BAHNEMANN, M., HEEKEREN, H., WOLF, O. & CONVIT, A. (2008). Dissociation of cognitive and emotional empathy in adults with Asperger syndrome using the Multifaceted Empathy Test (MET). *Journal of Autism and Developmental Disorders*.

EASTER, D.W. & BEACH, W. (2004). Competent patient care is dependent upon attending to empathic opportunities presented during interview sessions. *Curr Surg*.

EIDE, H., FRANKEL, R., HAAVERSEN, A.C., VAUPEL, K.A., GRAUGAARD, P.K. & FINSET, A. (2004). Listening for feelings: Identifying and coding empathic and potential empathic opportunities in medical dialogues. *Patient Educ Couns.*

EIDE, H., SIBBERN, T. & JOHANNESSEN, T. (2011). Empathic accuracy of nurses' immediate responses to fibromyalgia patients' expressions of negative emotions: an evaluation using interaction analysis. *J Adv Nurs*.

ESLINGER, P.J., MOORE, P., ANDERSON, C. & MURRAY, G. (2011). Social cognition, executive functioning, and neuroimaging correlates of empathic deficits in frontotemporal dementia. T*he Journal of Neuropsychiatry and Clinical Neurosciences*.

EVERSON, N., LEVETT-JONES, T., LAPKIN, S., PITT, V., van der RIET, P., ROSSITER, R., JONES, D., GILLIGAN, C., COURTNEY-PRATT, H. (2015). Measuring the impact of a 3D simulation experience on nursing students' cultural empathy using a modified version of the Kiersma-Chen Empathy Scale. *J Clin Nurs*.

FERNÁNDEZ, A. & SANTIAGO, A. (2011). Testing the psychometric properties of the Interpersonal Reactivity Index (IRI) in Chile: Empathy in a different cultural context. *European Journal of Psychological Assessment*.

FERRARI, P.F. (2014). The neuroscience of social relations. A comparative-based approach to empathy and to the capacity of evaluating others' action value. *Behaviour*.

FIELDS, S.K., HOJAT, M., GONNELLA, J.S., MANGIONE, S., KANE, G. & MAGEE, M. (2004). Comparisons of nurses and physicians on an operational measure of empathy. *Eval Health Prof*.

FIELDS, S.K., MAHAN, P., TILLMAN, P., HARRIS, J., MAXWELL, K. & HOJAT, M. (2011). Measuring empathy in healthcare profession students using the Jefferson Scale of Physician Empathy: Health provider-student version. *J Interprof Care*.

FINN, S.E. (2009). The many faces of empathy in experiential, person-centered, collaborative assessment. *Journal of Personal Assessment*.

FJORTOFT, N., VAN WINKLE, L.J. & HOJAT, M. (2011). Measuring empathy in pharmacy students. *Am J Pharm Educ*.

FORD, R.M. & ABERDEIN, B. (2015). Exploring social influences on the joint Simon task: Empathy and friendship. *Front Psychol.*

FREEDBERG, S. (2007). Re-examining empathy: A relational-feminist point of view. *Social Work*.

FROMAN, R.D. & PELOQUIN, S.M. (2001). Rethinking the use of the Hogan Empathy Scale: A critical psychometric analysis. *Am J Occup Ther*.

GARCÍA-MORILLO, S., BERNABEU-WITTEL, M., CASSANI, M., RINCÓN, M., YERRO PÁEZ, V. & OLLERO BATURONE, M.

(2007). Influence of biopsychosocial assessment on degree of doctor-patient empathy in a cohort of patients with multiple diseases. *Rev Clin Esp*.

GERDES, K.E., LIETZ, C.A. & SEGAL, E.A. (2011). Measuring empathy in the 21st century: Development of an empathy index rooted in social cognitive neuroscience and social justice. *Social Work Research*.

GILET, A.L., STUDER, J., MELLA, N., GRÜHN, D. & LABOUVIE-VIEF, G. (2013). Assessing dispositional empathy in adults: A French validation of the Interpersonal Reactivity Index (IRI). *Canadian Journal of Behavioural Science*.

GIUMMARRA, M.J., FITZGIBBON, B.M., GEORGIOU-KARISTIANIS, N., BEUKELMAN, M., VERDEJO-GARCIA, A., BLUMBERG, Z., CHOU, M. & GIBSON, S.J. (2015). Affective, sensory and empathic sharing of another's pain: The Empathy for Pain Scale. *Eur J Pain*.

GLASER, K.M., MARKHAM, F.W., ADLER, H.M., McMANUS, P.R. & HOJAT, M. (2007). Relationships between scores on the Jefferson Scale of physician empathy, patient perceptions of physician empathy, and humanistic approaches to patient care: A validity study. *Med Sci Monit*.

GLEICHGERRCHT, E., TORRALVA, T., RATTAZZI, A., MARENCO, V., ROCA, M. & MANES, F. (2013). Selective impairment of cognitive empathy for moral judgment in adults with high functioning autism. *Soc Cogn Affect Neurosci*.

GOLAN, O. & BARON-COHEN, S. (2006). Systemizing empathy: Teaching adults with Asperger syndrome or high-functioning autism to recognize complex emotions using interactive multimedia. *Development and Psychopathology*.

GORDON-GILES, N. & WAFA, Z. (2009). Assessing the beyond words educational model for empowering women, decreasing prejudice and enhancing empathy. *American Journal of Dance Therapy*.

GOSSELIN, É., PAUL-SAVOIE, É., LAVOIE, S. & BOURGAULT, P. (2015). Validity of the French version of the Reynolds Empathy Scale among Intensive Care Nurses. *Journal of Nursing Measurement*.

GOUVEIA, V.V., MILFONT, T.L., GOUVEIA, R.S.V., NETO, J.R. & GALVÃO, L. (2012). Brazilian-Portuguese empathy quotient: Evidences of its construct validity and reliability. *The Spanish Journal of Psychology*.

GRADY, M.D. & ROSE, R.A. (2011). The Empathy Index: An evaluation of the psychometric properties of a new empathy measure for sex offenders. *Journal of Interpersonal Violence*.

GRYNBERG, D. & MAURAGE, P. (2014). Pain and empathy: The effect of self-oriented feelings on the detection of painful facial expressions. *PLoS One*.

GROEN, Y., FUERMAIER, A.B., DEN HEIJER, A.E., TUCHA, O. & ALTHAUS, M. (2015). The empathy and systemizing quotient: The psychometric properties of the Dutch version and a review of the cross-cultural stability. *J Autism Dev Disord*.

GROVE, R., BAILLIE, A., ALLISON, C., BARON-COHEN, S. & HOEKSTRA, R.A. (2014). The latent structure of cognitive and emotional empathy in individuals with autism, first-degree relatives and typical individuals. *Mol Autism*.

GU, J., LAU, J.T., WANG, Z., WU, A.M., TAN, X. (2015). Perceived empathy of service providers mediates the association between perceived discrimination and behavioral intention to take up HIV antibody testing again among men who have sex with men. *PLoS One*.

HAGENMULLER, F., RÖSSLER, W., WITTWER, A. & HAKER, H. (2014). Juicy lemons for measuring basic empathic resonance. *Psychiatry Res*.

HALL, A.E. & BRACKEN, C.C. (2011). I really liked that movie": Testing the relationship between trait empathy, transportation, perceived realism, and movie enjoyment. *Journal of Media Psychology: Theories, Methods, and Applications*.

HANDFORD, C., LEMON, J., GRIMM, M.C. & VOLLMER-CONNA, U. (2013). Empathy as a function of clinical exposure--reading emotion in the eyes. *PLoS One*.

HANŽEVČAKI, M., JAKOVINA, T., BAJIĆ, Ž., TOMAC, A. & MERCER, S. (2015). Reliability and validity of the Croatian version of Consultation and Relational Empathy (CARE) Measure in primary care setting. *Croat Med J*.

HASAN, S., AL-SHARQAWI, N., DASHTI, F., ABDULAZIZ, M., ABDULLAH, A., SHUKKUR, M., BOUHAIMED, M. & THALIB, L. (2013). Level of empathy among medical students in Kuwait University, Kuwait. *Med Princ Pract*

HEIDENREICH, K.S. (2001). Empathy in the physician-patient relation-tool or ethics? *Tidsskr Nor Laegeforen*.

HENGARTNER, M.P., AJDACIC-GROSS, V., RODGERS, S., MÜLLER, M., HAKER, H. & RÖSSLER, W. (2014). Fluid intelligence and empathy in association with personality disorder trait-scores: Exploring the link. *European Archives of Psychiatry and Clinical Neuroscience*.

HENNESSY, M., WALTER, J.S. & VESS, J. (2002). An evaluation of the Empat as a measure of victim empathy with civilly committed sexual offenders. *Sex Abuse.*

HENRY, J.D., BAILEY, P.E. & RENDELL, P.G. (2008). Empathy, social functioning and schizotypy. *Psychiatry Res*.

HOJAT, M., GONNELLA, J.S., MANGIONE, S., NASCA, T.J., VELOSKI, J.J., ERDMANN, J.B., CALLAHAN, C.A. & MAGEE,

M. (2002). Empathy in medical students as related to academic performance, clinical competence and gender. *Med Educ.*

HOJAT, M., GONNELLA, J.S., NASCA, T.J., MANGIONE, S., VELOKSI, J.J. & MAGEE, M. (2002). The Jefferson Scale of Physician Empathy: Further psychometric data and differences by gender and specialty at item level. *Acad Med.*

HOJAT, M. & GONNELLA, J.S. (2015). Eleven years of data on the Jefferson Scale of Empathy-Medical Student version (JSE-S): Proxy norm data and tentative cutoff scores. *Med Princ Pract.*

HOJAT, M. & LANOUE, M. (2014). Exploration and confirmation of the latent variable structure of the Jefferson scale of empathy. *Int J Med Educ.*

HOJAT, M., MANGIONE, S., KANE, G.C. & GONNELLA, J.S. (2005). Relationships between scores of the Jefferson Scale of Physician Empathy (JSPE) and the Interpersonal Reactivity Index (IRI). *Med Teach.*

HOJAT, M., MICHALEC, B., VELOSKI, J.J. & TYKOCINSKI, M.L. (2015). Can empathy, other personality attributes, and level of positive social influence in medical school identify potential leaders in medicine? *Acad Med.*

HOJAT, M., MANGIONE, S., NASCA, T.J., GONNELLA, J.S. & MAGEE, M. (2005). Empathy scores in medical school and ratings of empathic behavior in residency training 3 years later. *The Journal of Social Psychology*.

HOWLAND, M. & RAFAELI, E. (2010). Bringing everyday mind reading into everyday life: Assessing empathic accuracy with daily diary data. *Journal of Personality*.

HSIAO, C.Y., TSAI, Y.F. & KAO, Y.C. (2013). Psychometric properties of a Chinese version of the Jefferson Scale of Empathy-Health Profession Students. *J Psychiatr Ment Health Nurs*.

IACONO, V., ELLENBOGEN, M.A., WILSON, A.L., DESORMEAU, P. & NIJJAR, R. (2015). Inhibition of personally-relevant angry faces moderates the effect of empathy on interpersonal functioning. *PLoS One*.

IMRAN, N., AFTAB, A.M., HAIDER, I. & FARHAT, A. (2013). Educating tomorrow's doctors: A cross sectional survey of emotional intelligence and empathy in medical students of Lahore. *Pak J Med Sci*.

JAMIESON, M., KRUPA, T., O'RIORDAN, A., O'CONNOR, D. et al. (2006). Developing empathy as a foundation of client-centred practice: Evaluation of a university curriculum initiative. *The Canadian Journal of Occupational Therapy*.

JANG, S.S., SEO, J.H., CHO, G.J., HONG, S.C. & WOO, H.O. (2010). Correlation of communication skills for emotional empathy and academic achievement on clinical performance examinations. *Korean J Med Educ.*

JANISSE, T. (2006). Empathy: In a moment, a powerful therapeutic tool. *Perm J*.

JEON, S. & CHO, E. (2015). Assessment of Korean pharmacy students' empathy using the Jefferson Scale of Empathy. *Am J Pharm Educ.*

JEUNG, H. & HERPERTZ, S.C. (2014). Impairments of interpersonal functioning: Empathy and intimacy in borderline personality disorder. *Psychopathology*.

JOHNSTONE, B., COHEN, D., KIRK, K.B., GLASS, B. & SHAWN, E.C. (2015). Functional and structural indices of empathy: Evidence for self-orientation as a neuropsychological foundation of empathy. *Neuropsychology*.

JUNTUNEN, A. & JARMO, S., (2000). Library as the student's Cornerstone or obstacle: Evaluating the method of empathy-based stories. *Libri*.

KANE, G.C., GOTTO, J.L., MANGIONE, S., WEST, S. & HOJAT, M. (2007). Jefferson scale of patient's perceptions of physician empathy: Preliminary psychometric data. *Croat Med J*.

KARAFANTIS, D.M. (2011). The effects of ethnocultural empathy on level of stereotyping toward college athletes. *J Evid Based Soc Work*.

KATAOKA, H.U., KOIDE, N., OCHI, K., HOJAT, M. & GONNELLA, J.S. (2009). Measurement of empathy among Japanese medical students: Psychometrics and score differences by gender and level of medical education. *Acad Med.*

KERR, J.L., STAHNKE, A.M. & BEHNEN, E.M. (2015). Assessing empathy and self-efficacy levels of pharmacy students in an elective diabetes management course. *Am J Pharm Educ.*

KERSTEN, P., WHITE, P.J. & TENNANT, A. (2012). The consultation and relational empathy measure: An investigation of its scaling structure. *Disabil Rehabil*.

KHADEMALHOSSEINI, M., KHADEMALHOSSEINI, Z. & MAHMOODIAN, F. (2014). Comparison of empathy score among medical students in both basic and clinical levels. *J Adv Med Educ Prof.*

KIERSMA, M.E., CHEN, A.M., YEHLE, K.S. & PLAKE, K.S. (2013). Validation of an empathy scale in pharmacy and nursing students. *Am J Pharm Educ*.

KILIÇ, S.Ç., DOĞAN, E., SEVIMLIGÜL, G., YÜCEL, B., BOLAT, F., KAVAKÇI, O. & SENCAN, M. (2013). Assessing anxiety levels and empathic tendency in blood and platelet donors. *Transfus Apher Sci*.

KILPATRICK, K.L. & ARMIDALE, K.L. (2005). The parental empathy measure: A new approach to assessing child maltreatment risk. *American Journal of Orthopsychiatry*.

KIM, Y.T., LEE, J.J., SONG, H.J., KIM, J.H., KWON, D.H., KIM,

M.N., YOO, D.S., LEE, H.J., KIM, H.J. & CHANG, Y. (2010). Alterations in cortical activity of male methamphetamine abusers performing an empathy task: fMRI study. *Hum Psychopharmacol*.

KIM, J. & LEE, S.J. (2010). Reliability and validity of the korean version of the empathy quotient scale. *Psychiatry Investig*.

KLEIH, S.C. & KÜBLER, A. (2013). Empathy, motivation, and P300 BCI performance. *Front Hum Neurosci*.

KOLLER, I. & LAMM, C. (2015). Item response model investigation of the (German) Interpersonal Reactivity Index empathy questionnaire: Implications for analyses of group differences. *European Journal of Psychological Assessmen*t.

KONSTANTAKOPOULOS, G., OULIS, P., PLOUMPIDIS, D., PATRIKELIS, P., NIKITOPOULOU, S., PAPADIMITRIOU, G.N. & DAVID, A.S. (2014). Self-rated and performance-based empathy in schizophrenia: The impact of cognitive deficits. *Soc Neurosci*.

KOSONOGOV, V. (2014). The psychometric properties of the Russian version of the Empathy Quotient. *Psychology in Russia*.

KOZENÝ, J., TISANSKÁ, L. & HÖSCHL, C. (2013). Assessing empathy among czech medical students: A cross-sectional study. *Ceskoslovenska Psychologie*.

LAMBERTON, C.M., LEANA, C.R. & WILLIAMS, J.M. (2015). Measuring empathetic care: Development and validation of a self-report scale. *J Appl Gerontol*.

LAMM, C., NUSBAUM, H.C., MELTZOFF, A.N. & DECETY, J. (2007). What are you feeling? Using functional magnetic resonance imaging to assess the modulation of sensory and affective responses during empathy for pain. *PLoS One*.

LASES, S.S., ARAH, O.A., PIERIK, E.G., HEINEMAN, E. & LOMBARTS, M.J. (2014). Residents' engagement and empathy associated with their perception of faculty's teaching performance. *World J Surg*.

LATIMER, M., JACKSON, P., JOHNSTON, C. & VINE, J. (2011). Examining nurse empathy for infant procedural pain: Testing a new video measure. *Pain Research & Management: The Journal of the Canadian Pain Society*.

LATOUR, J.M., VAN GOUDOEVER, J.B., DUIVENVOORDEN, H.J., ALBER,S M.J., VAN DAM, N.A., DULLAART, E., VAN HEERDE, M., DE NEEF, M., VERLAAT, C.W., VAN VUGHT, E.M. & HAZELZET, J.A. (2011). Construction and psychometric testing of the EMPATHIC questionnaire measuring parent satisfaction in the pediatric intensive care unit. *Intensive Care Med*.

LAWRENCE, E.J., SHAW, P., BAKER, D., BARON-COHEN, S. & DAVID, A.S. (2004). Measuring empathy: Reliability and validity of the empathy quotient. *Psychological Medicine*.

LEE, S.J., KANG DO, H., KIM, C.W., GU, B.M., PARK, J.Y., CHOI, C.H., SHIN, N.Y., LEE, J.M. & KWON, J.S. (2010). Multi-level comparison of empathy in schizophrenia: An fMRI study of a cartoon task. *Psychiatry Res*.

LEIBERG, S. & ANDERS, S. (2006). The multiple facets of empathy: A survey of theory and evidence. *Prog Brain Res*.

LENOFF, L. (2003). Consequences of "Empathy": Rereading Kohut's (1959) "Examination of the Relationship Between Mode of Observation and Theory". *Progress in Self Psychology*.

LEOMBRUNI, P., DI LILLO, M., MINIOTTI, M., PICARDI, A., ALESSANDRI, G., SICA, C., ZIZZI, F., CASTELLI, L. & TORTA, R. (2014). Measurement properties and confirmatory factor analysis of the Jefferson Scale of Empathy in Italian medical students. *Perspect Med Educ*.

LEONG, L.E., CANO, A., WURM, L.H., LUMLEY, M.A., CORLEY, A.M. (2015). A perspective-taking manipulation leads to greater empathy and less pain during the cold pressor task. *Pain*.

LEPAGE, J.F., LORTIE, M., TASCHEREAU-DUMOUCHEL, V. & THÉORET, H. (2009). Validation of French-Canadian Versions of the Empathy Quotient and Autism Spectrum Quotient. *Canadian Journal of Behavioural Science*.

LEWIS, M.A. (2011). Gain of function: Empathy for the uncertain patient with cancer. *J Clin Oncol*.

LISHNER, D.A., VITACCO, M.J., HONG, P.Y., MOSLEY, J., MISKA, K. & STOCKS, E.L. (2012). Evaluating the relation between psychopathy and affective empathy: Two preliminary studies. *Int J Offender Ther Comp Criminol*.

LYONS, C. & HAZLER, R.J. (2002). The influence of student development level on improving counselor student empathy. *Counselor Education and Supervision*.

LYSAKER, P.H., HASSON-OHAYON, I., KRAVETZ, S., KENT, J.S. & ROE, D. (2013). Self perception of empathy in schizophrenia: Emotion recognition, insight, and symptoms predict degree of self and interviewer agreement. *Psychiatry Res*.

LOUREIRO, J., GONÇALVES-PEREIRA, M., TRANCAS, B., CALDAS-DE-ALMEIDA, J.M. & CASTRO-CALDAS, A. (2011). Empathy in the doctor-patient relationship as viewed by first-year medical students: Data on validity and sensibility to change of the Jefferson Measure in Portugal. *Acta Med Port*.

LOW, M. & LaSCALA, S. (2015). Medical memoir: A tool to teach empathy to nursing students. *Nurse Educ Today*.

LÜDTKE, J., BURKHARD, M.S. & JACOBS, A.M. (2014). Immersing in the stillness of an early morning: Testing the mood empathy hypothesis of poetry reception. *Psychology of Aesthetics, Creativity, and the Arts*.

MANGIONE, S., KANE, G.C., CARUSO, J.W., GONNELLA, J.S.,

NASCA, T.J. & HOJAT, M. (2002). Assessment of empathy in different years of internal medicine training. *Med Teach.*

MARKIN, R. (2011). Does my group know how I feel? Measuring intellectual empathy in groups using the social relations model. *Group Dynamics: Theory, Research, and Practice*.

MARCI, C.D. (2008). Measuring empathy during psychotherapy. *Harvard Health Publications. The Harvard Mental Health Letter*.

MARTINEZ, A.G., STUEWIG, J. & TANGNEY, J.P. (2014). Can perspective-taking reduce crime? Examining a pathway through empathic-concern and guilt-proneness. *Pers Soc Psychol Bull.*

MATHERSUL, D., McDONALD, S. & RUSHBY, J.A. (2013). Understanding advanced theory of mind and empathy in high-functioning adults with autism spectrum disorder. *J Clin Exp Neuropsychol.*

McCORMICK, L.M., BRUMM, M.C., BEADLE, J.N., PARADISO, S., YAMADA, T. & ANDREASEN, N. (2012). Mirror neuron function, psychosis, and empathy in schizophrenia. *Psychiatry Res.*

McDONALD, P., ASHTON, K., BARRATT, R., DOYLE, S., IMESON, D., MEIR, A. & RISSER, G. (2015). Clinical realism: A new literary genre and a potential tool for encouraging empathy in medical students. *BMC Med Educ.*

McKEEVER, R. (2015). Vicarious experience: Experimentally testing the effects of empathy for media characters with severe depression and the intervening role of perceived similarity. *Health Commun*.

McLELLAN, T. & McKINLAY, A. (2013). Sensitivity to emotion, empathy and theory of mind: Adult performance following childhood TBI. *Brain Inj.*

MELCHERS, M., MONTAG, C., MARKETT, S. & REUTER, M. (2015). Assessment of empathy via self-report and behavioural paradigms: Data on convergent and discriminant validity. *Cogn Neuropsychiatry*.

MERCER, S.W., MAXWELL, M., HEANEY, D. & WATT, G.C. (2004). The consultation and relational empathy (CARE) measure: Development and preliminary validation and reliability of an empathy-based consultation process measure. *Fam Pract.*

MERCER, S.W., McCONNACHIE, A., MAXWELL, M., HEANEY, D. & WATT, G.C. (2005). Relevance and practical use of the Consultation and Relational Empathy (CARE) Measure in general practice. *Fam Pract*.

MICHAELS, T.M., HORAN, W.P., GINGER, E.J., MARTINOVICH, Z., PINKHAM, A.E. & SMITH, M.J. (2014). Cognitive empathy contributes to poor social functioning in schizophrenia: Evidence from a new self-report measure of cognitive and affective empathy. *Psychiatry Res.*

MICHALEC, B. (2010). An assessment of medical school stressors on preclinical students' levels of clinical empathy. *Current Psychology*.

MOMMAERTS, J.L., GOUBERT, L. & DEVROEY, D. (2012). Empathy beyond the conceptual level: Core nonspecific factors of psychotherapy. *Perspect Biol Med.*

MONTANARI, P., PETRUCCI, C., RUSSO, S., MURRAY, I., DIMONTE, V. & LANCIA, L. (2015). Psychometric properties of the Jefferson Scale of Empathy-Health Professional Student's version: An Italian validation study with nursing students. *Nurs Health Sci*.

MORRIS, R., BRAMHAM, J., SMITH, E. & TCHANTURIA, K. (2014). Empathy and social functioning in anorexia nervosa before and after recovery. *Cogn Neuropsychiatry*.

MORSANYI, K., PRIMI, C., HANDLEY, S.J., CHIESI, F. & GALLI, S. (2012). Are systemizing and autistic traits related to talent and interest in mathematics and engineering? Testing some of the central claims of the empathizing-systemizing theory. *Br J Psychol.*

MUELLER, M.A. & WAAS, G.A. (2002). College students' perceptions of suicide: the role of empathy on attitudes, evaluation, and responsiveness. *Death Stud.*

MUSSO, C.G. & ENZ, P.A. (2015). Art as an instrument to develop empathy. *Arch Argent Pediatr.*

NEUMANN, M., SCHEFFER, C., LÄNGLER, A., TAUSCHEL, D., JOOS, S., LUTZ, G. & EDELHÄUSER, F. (2010). Relevance and barriers of physician empathy in daily practice - current state of research and qualitative survey of physicians. *Rehabilitation (Stuttg)*.

NEUMANN, M., WIRTZ, M., BOLLSCHWEILER, E., WARM, M., WOLF, J. & PFAFF, H. (2008). Psychometric evaluation of the German version of the "Consultation and Relational Empathy" (CARE) measure at the example of cancer patients. *Psychotherapy Psychosomatic Medical Psychology*.

NEW, A.S., ROT, M., RIPOLL, L.H., PEREZ-RODRIGUEZ, M., LAZARUS, S., ZIPURSKY, E., WEINSTEIN, S.R., KOENIGSBERG, H.W., HAZLETT, E.A., GOODMAN, M. & SIEVER L.J. (2012). Empathy and alexithymia in borderline personality disorder: clinical and laboratory measures. *Journal of Personality Disorders*.

NOMURA, K. & AKAI, S. (2012). Empathy with fictional stories: Reconsideration of the fantasy scale of the interpersonal reactivity index. *Psychol Rep*.

NORMAN, M., AMBROSE, S.A. & HUSTON, T.A. (2006). Assessing and addressing faculty morale: Cultivating consciousness, empathy, and empowerment. *Review of Higher Education*.

NORRING, M., WIKMAN, I., HOKKANEN, A.H., KUJALA, M.V. &

HÄNNINEN, L. (2014). Empathic veterinarians score cattle pain higher. *Vet J*.

O'SHEA, E.C., PAVIA, S., DYER, M., CRADDOCK, G. & MURPHY, N. (2014). Measuring the design of empathetic buildings: A review of universal design evaluation methods. *Disabil Rehabil Assist Technol*.

O'CONNOR, K., KING, R., MALONE, K.M. & GUERANDEL, A. (2014). Clinical examiners, simulated patients, and student self-assessed empathy in medical students during a psychiatry objective structured clinical examination. *Acad Psychiatry*.

OLDERBAK, S., SASSENRATH, C., KELLER, J. & WILHELM, O. (2014). An emotion-differentiated perspective on empathy with the emotion specific empathy questionnaire. *Front Psychol*

PARK, K.H., ROH, H., SUH, D.H. & HOJAT, M. (2015). Empathy in Korean medical students: Findings from a nationwide survey. *Med Teach.*

PARO, H.B., DAUD-GALLOTTI, R.M., TIBÉRIO, I.C., PINTO, R.M. & MARTINS, M.A. (2012). Brazilian version of the Jefferson Scale of Empathy: Psychometric properties and factor analysis. *BMC Med Educ.*

PEDERSEN, A.F., CARLSEN, A.H. & VEDSTED, P. (2015). Association of GPs' risk attitudes, level of empathy, and burnout status with PSA testing in primary care. *Br J Gen Pract.*

PÉLOQUIN, K. & LAFONTAINE, M.F. (2010). Measuring empathy in couples: Validity and reliability of the Interpersonal Reactivity Index for couples. *J Pers Assess.*

PFALLER, M., VOLBERG, G. & FISCHER, P. (2012). Letter on Yamada and Decety (2009): Unconscious affective processing and empathy: an investigation of subliminal priming on the detection of painful facial expressions. *Pain*.

PINEDA, D.A., AGUIRRE-ACEVEDO, D.C., TRUJILLO, N., VALENCIA, A.M., PAREJA, Á., TOBÓN, C., VELILLA, L. & IBÁÑEZ, A. (2013). Dimensions of empathy in ex-combatants of the Colombian armed conflict using a standardized scale. R*ev Colomb Psiquiatr*.

PRETI, A., VELLANTE, M., BARON-COHEN, S., ZUCCA, G., PETRETTO, D.R. & MASALA, C. (2011). The Empathy Quotient: A cross-cultural comparison of the Italian version. *Cogn Neuropsychiatry*.

PREUSCHE, I. & WAGNER-MENGHIN, M. (2013). Rising to the challenge: Cross-cultural adaptation and psychometric evaluation of the adapted German version of the Jefferson Scale of Physician Empathy for Students (JSPE-S). *Adv Health Sci Educ Theory Pract*.

RALFS, S. & BEAIL, N. (2012). Assessing components of empathy in sex-offenders with intellectual disabilities. *J Appl Res Intellect Disabil.*

RASCH, V., MUHAMMAD, H., URASSA, E. & BERGSTROM, S. (2000). Self-reports of induced abortion: An empathetic setting can improve the quality of data. *American Journal of Public Health*.

RASOAL, C., JUNGERT, T., HAU, S. & ANDERSSON, G. (2011). Development of a Swedish version of the scale of ethnocultural empathy. *Psychology*.

RENIERS, R.L., CORCORAN, R., DRAKE, R., SHRYANE, N.M. & VÖLLM, B.A. (2011). The QCAE: A questionnaire of cognitive and affective empathy. *J Pers Assess*.

RICHTER, D. & KUNZMANN, U. (2011). Age differences in three facets of empathy: Performance-based evidence. *Psychology and Aging*.

RYSEWYK, SV. (2009). Comment on: Unconscious affective processing and empathy: An investigation of subliminal priming on the detection of painful facial expressions. *Pain*.

RODRIGUEZ, C.M., COOK, A.E. & JEDRZIEWSKI, C.T. (2012). Reading between the lines: Implicit assessment of the association of parental attributions and empathy with abuse risk. *Child Abuse Negl.*

ROFF, S. (2015). Reconsidering the "decline" of medical student empathy as reported in studies using the Jefferson Scale of Physician Empathy-Student version (JSPE-S). *Med Teach.*

ROH, M.S., HAHM, B.J., LEE, D.H. & SUH, D.H. (2010). Evaluation of empathy among Korean medical students: a cross-sectional study using the Korean version of the Jefferson Scale of Physician Empathy. *Teach Learn Med.*

SAMSON, A.C., STANFORD, A.C. & HUBER, O.W. (2010). Short German versions of empathizing and systemizing self-assessment scales. *Swiss Journal of Psychology/Schweizerische Zeitschrift für Psychologie/Revue Suisse de Psychologie*.

SCHNEIDER, K., REGENBOGEN, C., PAULY, K.D., GOSSEN, A., SCHNEIDER, D.A., MEVISSEN, L., MICHEL, T.M., GUR, R.C., HABEL, U. & SCHNEIDER, F. (2013). Evidence for gender-specific endophenotypes in high-functioning autism spectrum disorder during empathy. *Autism Res.*

SEIDEL, E.M., HABEL, U., FINKELMEYER, A., HASMANN, A., DOBMEIER, M. & DERNTL, B. (2012). Risk or resilience? Empathic abilities in patients with bipolar disorders and their first-degree relatives. *Journal of Psychiatry Responses*.

SHARIAT, S.V., ESHTAD, E. & ANSARI, S. (2010). Empathy and its correlates in Iranian physicians: A preliminary psychometric study of the Jefferson Scale of Physician Empathy. *Med Teach*.

SHARIAT, S.V. & HABIBI, M. (2013). Empathy in Iranian medical students: measurement model of the Jefferson scale of empathy. *Med Teach.*

SHASHIKUMAR, R., CHAUDHARY, R., RYALI, V.S., BHAT, P.S., SRIVASTAVA, K., PRAKASH, J. & BASANNAR, D. (2014). Cross sectional assessment of empathy among undergraduates from a medical college. *Med J Armed Forces India*.

SHEA, S.C. & BARNEY, C. (2015). Teaching clinical interviewing skills using role-playing: Conveying empathy to performing a suicide assessment: A primer for individual role-playing and scripted group role-playing. *Psychiatr Clin North Am.*

SIMPSON, J.A., ORIÑA, M.M. & ICKES, W. (2003). when accuracy hurts, and when it helps: A test of the empathic accuracy model in marital interactions. *Journal of Personality and Social Psychology*.

SMITH, M.J., HORAN, W.P., COBIA, D.J., KARPOUZIAN, T.M., FOX, J.M., REILLY, J.L. & BREITER, H.C. (2014). Performance-based empathy mediates the influence of working memory on social competence in schizophrenia. *Schizophr Bull.*

SMITH, M.J., HORAN, W.P., KARPOUZIAN, T.M., ABRAM, S.V., COBIA, D.J. & CSERNANSKY, J.G. (2012). Self-reported empathy deficits are uniquely associated with poor functioning in schizophrenia. *Schizophr Res.*

SMITH, M.J., SCHROEDER, M.P., ABRAM, S.V., GOLDMAN, M.B., PARRISH, T.B., WANG, X., DERNTL, B., HABEL, U., DECETY, J., REILLY, J.L., CSERNANSKY, J.G. & BREITER, H.C. (2015). Alterations in brain activation during cognitive empathy are related to social functioning in schizophrenia. *Schizophr Bull.*

SONNBY-BORGSTRÖM, M., JÖNSSON, P. & SVENSSON, O. (2003). Emotional empathy as related to mimicry reactions at different levels of information processing. *Journal of Nonverbal Behavior*.

SPRENG, R.N., McKINNON, M.C., MAR, R.A. & LEVINE, B. (2009). The Toronto Empathy Questionnaire: Scale development and initial validation of a factor-analytic solution to multiple empathy measures. *J Pers Assess.*

STANSFIELD, R.B., SCHWARTZ, A., O'BRIEN, C.L., DEKHTYAR, M., DUNHAM, L. & QUIRK, M. (2015). Development of a metacognitive effort construct of empathy during clinical training: a longitudinal study of the factor structure of the Jefferson Scale of Empathy. *Adv Health Sci Educ Theory Pract.*

STEELE, D.J. & HULSMAN, R.L. (2008). Empathy, authenticity, assessment and simulation: A conundrum in search of a solution. *Patient Educ Couns.*

STEINHAUSEN, S., OMMEN, O., THÜM, S., LEFERING, R., KOEHLER, T., NEUGEBAUER, E. & PFAFF, H. (2014). Physician empathy and subjective evaluation of medical treatment outcome in trauma surgery patients. *Patient Education Counselling.*

SUCKSMITH, E., ALLISON, C., BARON-COHEN, S., CHAKRABARTI, B. & HOEKSTRA, R.A. (2013). Empathy and emotion recognition in people with autism, first-degree relatives, and controls. *Neuropsychologia*.

SUH, D.H., HONG, J.S., LEE, D.H., GONNELLA, J.S. & HOJAT, M. (2012). The Jefferson Scale of Physician Empathy: A preliminary psychometric study and group comparisons in Korean physicians. *Med Teach.*

SUZUKI, Y., GALLI, L., IKEDA, A., ITAKURA, S. & KITAZAKI, M. (2015). Measuring empathy for human and robot hand pain using electroencephalography. *Sci Rep.*

TAVAKOL, S., DENNICK, R. & TAVAKOL, M. (2011). Psychometric properties and confirmatory factor analysis of the Jefferson Scale of Physician Empathy. *BMC Med Educ.*

TEHERANI, A., HAUER, K.E. & O'SULLIVAN, P. (2008). Can simulations measure empathy? Considerations on how to assess behavioral empathy via simulations. *Patient Educ Couns.*

TELLES, S., SINGH, N. & BALKRISHNA, A. (2015). Augmenting brain function with meditation: Can detachment coincide with empathy? *Front Syst Neurosci*.

TENO, J.M. & CONNOR, S.R. (2009). Referring a patient and family to high-quality palliative care at the close of life: "We met a new personality... with this level of compassion and empathy". *JAMA*.

THOMA, P. & BELLEBAUM, C. (2012). Your Error's Got me Feeling - How Empathy Relates to the Electrophysiological Correlates of Performance Monitoring. *Front Hum Neurosci.*

THOMA, P., NORRA, C., JUCKEL, G., SUCHAN, B. & BELLEBAUM, C. (2015). Performance monitoring and empathy during active and observational learning in patients with major depression. *Biol Psychol.*

THORSTEN, M.E. & TOPOLINSKI, S. (2015). Spatial and empathic perspective-taking correlate on a dispositional level. *Social Cognition*.

TIERNEY, D.W. & McCABE, M.P. (2001). An evaluation of self-report measures of cognitive distortions and empathy among Australian sex offenders. *Archives of Sexual Behavior.*

TRAN, U.S., LAIREITER, A.R., SCHMITT, D.P., NEUNER, C., LEIBETSEDER, M., SZENTE-VORACEK, S.L. & VORACEK, M. (2013). Factorial structure and convergent and discriminant validity of the E (Empathy) scale. *Psychol Rep.*

TRUMPETER, N.N., WATSON, P.J., O'LEARY, B.J. & WEATHINGTON, B.L. (2008). Self-functioning and perceived parenting: Relations of parental empathy and love inconsistency with narcissism, depression, and self-esteem. *The Journal of Genetic Psychology*.

TSIANTOU, D., LAZARIDOU, D., COOLIDGE, T., ARAPOSTATHIS, K.N. & KOTSANOS, N. (2013). Psychometric properties of the

Greek version of the Toronto Composite Empathy Scale in Greek dental students. *Eur J Dent Educ.*

ULLRICH, P., WOLLBRÜCK, D., DANKER, H. & SINGER, S. (2011). Evaluation of psycho-social training for speech therapists in oncology. Impact on general communication skills and empathy. A qualitative pilot study. *Journal of Cancer Education*.

VACHON, D.D. & LYNAM, D.R. (2015). Fixing the problem with empathy: Development and validation of the affective and cognitive measure of empathy. *Assessment*.

VAN VUGT, E., ASSCHER, J., HENDRIKS, J., STAMS, G.J., BIJLEVELD, C. & VAN DER LAAN, P. (2012). Assessment of moral judgment and empathy in young sex offenders: A comparison of clinical judgment and test results. *Int J Offender Ther Comp Criminol*.

VEMURI, K. & SURAMPUDI, B.R. (2015). an exploratory investigation of functional network connectivity of empathy and default mode networks in a free-viewing task. *Brain Connect*.

VITAGLIONE, G.D. & BARNETT, M.A. (2003). Assessing a new dimension of empathy: Empathic anger as a predictor of helping and punishing desires. *Motivation and Emotion*.

VÖLLM, B.A., TAYLOR, A.N.W., RICHARDSON, P., CORCORAN, R., STIRLING, J., McKIE, S., DEAKIN, J.F.W. & ELLIOTT, R. (2006). Neuronal correlates of theory of mind and empathy: A functional magnetic resonance imaging study in a nonverbal task. *NeuroImage*.

WALOCHA, E., TOMASZEWSKA, I.M. & MIZIA, E. (2013). Empathy level differences between Polish surgeons and physicians. *Folia Med Cracov*.

WANG, Y., YUAN, B., ROBERTS, K., WANG, Y., LIN, C. & SIMONS, R.F. (2014). How friendly is a little friendly competition? Evidence of self-interest and empathy during outcome evaluation. *Int Journal Psychophysiology*.

WANG, Y., NEUMANN, D.L., SHUM, D.H., LIU, W.H., SHI, H.S., YAN, C., LUI, S.S., ZHANG, Q., LI, Z., CHEUNG, E.F. & CHAN, R.C. (2013). Cognitive empathy partially mediates the association between negative schizotypy traits and social functioning. *Psychiatry Res*.

WANG, X., GU, X., FAN, J., WANG, S., ZHAO, F., HOF, P.R., LIU, P. & GAO, Z. (2014). Recovery of empathetic function following resection of insular gliomas. *Journal of Neurooncology*.

WANG, Y.W., DAVIDSON, M.M., YAKUSHKO, O.F., SAVOY, H.B., TAN, J.A. & BLEIER, J.K. (2003). The Scale of Ethnocultural Empathy: Development, validation, and reliability. *Journal of Counseling Psychology*.

WARD, J., SCHAAL, M., SULLIVAN, J., BOWEN, M.E., ERDMANN, J.B. & HOJAT, M. (2009). Reliability and validity of the Jefferson Scale of Empathy in undergraduate nursing students. *Journal of Nursing Measurement*.

WEAR, D. & VARLEY, J.D. (2008). Rituals of verification: The role of simulation in developing and evaluating empathic communication. *Patient Educ Couns.*

WEBSTER, S.D. (2002). Assessing victim empathy in sexual offenders using the victim letter task. *Sex Abuse*.

WEN, D., MA, X., LI, H. & XIAN, B. (2013). Empathy in Chinese physicians: Preliminary psychometrics of the Jefferson Scale of Physician Empathy (JSPE). *Med Teach.*

WHEELWRIGHT, S.,, BARON-COHEN, S., GOLDENFELD, N., DELANEY, J., FINE, D., SMITH, R., WEIL, L. & WAKABAYASHI, A. (2006). Predicting Autism Spectrum Quotient (AQ) from the Systemizing Quotient-Revised (SQ-R) and Empathy Quotient (EQ). *Brain Res.*

WILLIAMS, B., BROWN, T., BOYLE, M. & DOUSEK, S. (2013). Psychometric testing of the Jefferson Scale of Empathy Health Profession Students' version with Australian paramedic students. *Nurs Health Sci*.

WILLIAMS, J.H., CAMERON, I.M., ROSS, E., BRAADBAART, L. & WAITER, G.D. (2015). Perceiving and expressing feelings through actions in relation to individual differences in empathic traits: The Action and Feelings Questionnaire (AFQ). *Cogn Affect Behav Neurosci.*

WILLIAMS, J.H., NICOLSON, A.T., CLEPHAN, K.J., DE GRAUW, H. & PERRETT, D.I. (2013). A novel method testing the ability to imitate composite emotional expressions reveals an association with empathy. *PLoS One.*

WINEFIELD, H.R. & CHUR-HANSEN, A. (2000). Evaluating the outcome of communication skill teaching for entry-level medical students: Does knowledge of empathy increase? *Medical Education*.

WIRTZ,, M., BOECKER, M., FORKMANN, T. & NEUMANN, M. (2011). Evaluation of the "Consultation and Relational Empathy" (CARE) measure by means of Rasch-analysis at the example of cancer patients. *Patient Education Counselling.*

WRIGHT, B., MCKENDREE, J., MORGAN, L., ALLGAR, V.L. & BROWN, A. (2014). Examiner and simulated patient ratings of empathy in medical student final year clinical examination: Are they useful? *BMC Med Educ.*

WRIGHT, D.B. & SKAGERBERG, E.M. (2012). Measuring empathizing and systemizing with a large US sample. *PLoS One.*

YAMADA, M. & DECETY, J. (2009). Unconscious affective processing and empathy: An investigation of subliminal priming on the detection of painful facial expressions. *Pain*.

YANG, K.T. & YANG, J.H. (2013). A study of the effect of a visual

arts-based program on the scores of Jefferson Scale for Physician Empathy. *BMC Med Educ*.

YOUNG, S., SEDGWICK, O., PERKINS, D., LISTER, H., SOUTHGATE, K., DAS, M., KUMARI, V., BISHOPP, D. & GUDJONSSO, G.H. (2015). Measuring victim empathy among mentally disordered offenders: Validating VERA-2. *J Psychiatr Res.*

YU, J. & KIRK, M. (2009). Evaluation of empathy measurement tools in nursing: Systematic review. *Journal Advanced Nurse*.

ZELINKOVÁ, J., SHAW, D.J., MARECEK, R., MIKL, M., URBÁNEK, T., HAVLÍCKOVÁ, D., ZÁMECNÍK, P., HAITOVÁ, P. & BRÁZDIL, M. (2014). An evaluation of traffic-awareness campaign videos: Empathy induction is associated with brain function within superior temporal sulcus. *Behavioral and Brain Functions.*