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The QCAE: A Questionnaire of Cognitive and Affective Empathy

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Empathy has been inconsistently defined and inadequately measured. This research aimed to produce a new and rigorously developed questionnaire. Exploratory ($n_1 = 640$) and confirmatory ($n_2 = 318$) factor analyses were employed to develop the Questionnaire of Cognitive and Affective Empathy (QCAE). Principal components analysis revealed 5 factors (31 items). Confirmatory factor analysis confirmed this structure in an independent sample. The hypothesized 2-factor structure (cognitive and affective empathy) was tested and provided the best and most parsimonious fit to the data. Gender differences, convergent validity, and construct validity were examined. The QCAE is a valid tool for assessing cognitive and affective empathy.

Human behavior is largely based on the interpretation of the actions of others, thereby reflecting our flexibility in the social world. To maintain this ability to adapt and survive social cognition relies on many mechanisms, of which empathy is one of the most important (Frith & Blakemore, 2003; Rankin, Kramer, & Miller, 2005; Völlm et al., 2006). The ability to empathize varies among individuals and is considered to be a fairly stable personality trait (Leiberg & Anders, 2006; Mangione et al., 2002) that represents a psychological quality that brings continuity to an individual's behavior in different situations and at different times (Zimbardo, Weber, & Johnson, 2003). It represents a key component of *agreeableness*, one of the five broad domains used to describe human personality (Graziano & Eisenberg, 1997). An increased understanding of the mechanisms of empathy is of great clinical and public health relevance. Empathic dysfunction has been associated with diverse psychiatric disorders such as psychopathy (Blair, 2005), antisocial personality disorder, conduct disorder, acquired sociopathy (Spinella, 2005), disorders of the autistic spectrum (Blair, 2005; Lee, Farrow, Spence, & Woodruff, 2004), and schizophrenia (Lee et al., 2004). Furthermore, a lack of empathy is often associated with callous and unemotional behavior, violence, aggression, and criminality, and is related to problems in social communication and interaction, resulting in unstable, impaired relationships (Blair, Mitchell, & Blair, 2005; Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001).

DEFINITIONAL ISSUES SURROUNDING EMPATHY

Although we all have an understanding of what empathy means, there is no general agreement on a definition sufficient for scientific enquiry. The main problem in constructing a widely accepted definition of empathy arises from the de-

bate about whether empathy involves recognizing emotion or experiencing it, or both (Bennett, 1995; Chlopan, McCain, Carbonell, & Hagen, 1985; Jolliffe & Farrington, 2004). Cohen and Strayer (1996), for example, postulated that empathy encompasses both by defining it as “the understanding and sharing in another's emotional state or context” (p. 523). Furthermore, the debate has focused on whether or not it is appropriate to include the actual behavioral response in a definition of empathy (Eisenberg, 2000; Vreeke & van der Mark, 2003). Eisenberg (2000) referred to empathy as “an affective response that stems from the apprehension or comprehension of another's emotional state or condition and is similar to what the other person is feeling or would be expected to feel” (p. 671). Eisenberg places the affective response at the center of her definition, instead of the apprehension or comprehension of another's emotional state or condition as is suggested in most other definitions of empathy.

Recently, it has been argued that empathy encompasses partly dissociable neurocognitive processes, suggesting a distinction between cognitive and affective empathy. Blair (2005) even distinguished three main systems that are grouped together in the term *empathy*: cognitive empathy, emotional empathy, and motor empathy. According to Blair, cognitive empathy is used where the individual represents the internal mental state of another individual, so equating cognitive empathy to theory of mind (ToM). With regard to emotional empathy, Blair distinguishes two main forms: a response to the emotional display of another person (facial and vocal expressions and body movements) and a response to other emotional stimuli (e.g., a response to a phrase such as “Adam just lost his house”). Motor empathy is described as the action of mirroring the motor responses of the observed person. According to Spinella (2005), the cognitive components of empathy involve the ability to mentally represent other peoples' mental processes, whereas the emotional components involve the actual emotional reaction. This distinction between cognitive and emotional or affective components of empathy has been endorsed by many other authors (Decety & Jackson, 2006; Gini, Albiero, Benelli, & Altoe, 2007; Jolliffe

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& Farrington, 2006; Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004; Rankin et al., 2005; Young, Gudjonsson, Terry, & Bramham, 2008).

It is clear from these definitions that the general consensus requires empathy to encompass a comprehension of other people's experience (cognitive empathy) as well as the ability to vicariously experience the emotional experience of others (affective empathy). Cognitive empathy requires that information is held in mind and manipulated. Visual, auditory, or situational cues are used to represent another person's cognitive and emotional state. This process of representation can take place at an explicit level, but it can also arise at an implicit, higher-order level as metarepresentation. Various ideas about another person's cognitive or emotional state are generated; by shifting one's attention back and forth, one's own cognitive and emotional state can be compared, contrasted, and aligned with that of the other person. The result is a working model that can be rapidly updated on the basis of incoming information. Affective empathy, on the other hand, more obviously involves a swift recognition of the other person's emotions on the basis of facial expressions, body gestures, and voice prosody. This elicits an emotional response to the other person's situation and the correct identification of one's own corresponding emotional state perhaps via self-reflection and insight. One's empathic state can then be expressed through emotional or verbal expressions or by displaying sympathy and providing comfort to the other person (Davis, 1983). Taking this together, we can infer that both the cognitive and affective components are necessary but distinct processes to enable an empathic response.

As there are no current definitions that encompass all of the presented stipulations, there is a need to devise a new definition of empathy. A working definition of empathy should consider its multidimensional nature without including behavioral expressions such as sympathy. It should consist of two parts: cognitive empathy and affective empathy. The fact that individual differences in empathic functioning exist needs to be considered when formulating these definitions. Furthermore, the definitions should imply a correct understanding of the other person's emotions, thereby stressing that cognitive empathy is not equivalent to ToM. ToM is commonly defined as "the ability to attribute mental states (desires, intentions and beliefs) to others" (Völlm et al., 2006, p. 90). Failure to represent other people's beliefs, knowledge, and intentions might result in a failure to see things from other people's perspective, and thus interferes with empathy (Shamay-Tsoory, Tomer, Berger, & Aharon-Peretz, 2003). Good cognitive empathic skills are likely to draw on the same underlying skills that enable ToM, but cognitive empathy is concerned with the attribution of emotions as opposed to cognitions, and as such the two constructs are potentially dissociable. Furthermore, definitions should exclude reactive emotions like sympathy, as genuine sympathy is an output of the empathic process and not part of it. For affective empathy, it is important to emphasize that it involves sensitivity to and experience of the other person's feelings, instead of a sharing or being aware of another's feelings. A distinction between self and other is maintained and needs to be addressed in the definitions. In what follows, *cognitive empathy* will be understood as the ability to construct a working model of the emotional states of others, and *affective empathy* will be understood as the ability to be sensitive to and vicariously experience the feelings of others.

MEASURING EMPATHY

Self-report questionnaires are a fast and easy-to-administer tool for assessing empathic experience and behavior. Over the years, several questionnaires have been put forward, with the Hogan Empathy Scale (HES; Hogan, 1969), Interpersonal Reactivity Index (IRI; Davis, 1983), Balanced Emotional Empathy Scale (BEES; Mehrabian, 2000), and Empathy Quotient (EQ; Baron-Cohen, Richler, Bisarya, Gurunathan, & Wheelwright, 2003) most commonly used. These questionnaires rely on different definitions of empathy that are more or less incompatible with the definitions of cognitive and affective empathy just offered. Besides the IRI, these questionnaires give little consideration to the multidimensional concept of empathy. Hogan (1969), for example, did not distinguish an affective empathic component and defined empathy as "the intellectual or imaginative apprehension of another's condition or state of mind" (p. 307). Baron-Cohen et al. (2003) also did not make this distinction in their EQ, but specifically focused on the empathic process. They described empathizing as "the drive to identify another person's emotions and thoughts, and to respond to these with an appropriate emotion" (p. 361), thereby allowing the empathizing person to predict a person's behavior and to care about how others feel. The main problem with broad definitions of empathy like this one is a lack of precision. A wide range of traits or qualities related to interpersonal functioning, and not just empathy, can contribute to the scores on these measures. On the other hand, narrow definitions might overlook important components of empathy. The BEES (Mehrabian, 2000), for example, only assesses emotional empathy by distinguishing individuals who typically experience more of other people's feelings from those who are generally less responsive to the emotional expressions and experiences of others. In an attempt to overcome these concerns, Davis (1980, 1983) set out to design a multidimensional individual difference measure of empathy, the IRI. This questionnaire contains four subscales: Perspective Taking, Fantasy, Empathic Concern, and Personal Distress. The Perspective Taking and Fantasy subscales are suggested to measure cognitive empathy, whereas the Empathic Concern and Personal Distress subscales assess affective empathy. The questionnaire aims to capture separately individual variations in cognitive perspective-taking tendencies as well as differences in the types of emotional reactions typically experienced. Yet this questionnaire is based on the broad definition of empathy as "the reactions of one individual to the observed experiences of another" (Davis, 1980, p. 113) and difficulties in understanding the relationships among the scales have been demonstrated. The Fantasy scale has often been omitted in interpersonal assessments and the Personal Distress scale assesses personal responses to emergency situations, rather than empathy (Jolliffe & Farrington, 2004), thereby crossing the thin line between empathy and sympathy (Jolliffe & Farrington, 2006).

More recently, the Basic Empathy Scale (BES; Jolliffe & Farrington, 2006) has been developed. This questionnaire aims to provide a clear distinction between cognitive and affective empathy. However, the adopted definition of empathy, "the understanding and sharing in another's emotional state or context" (Cohen & Strayer, 1996, p. 523), lacks precision in that it does not necessarily exclude other traits related to interpersonal functioning from its assessment. In addition, confirmatory factor analysis (CFA) was not conducted on a

sample fully independent from the one used for the exploratory factor analysis, thereby biasing the confirmatory analysis by tautology. A further criticism is that the cutoff criteria used for the various indexes in the CFA are somewhat lax by commonly accepted standards such as the ones suggested by Byrne (2001), Hu and Bentler (1999), and Kline (1998). Additionally, we view cognitive and affective empathy as composed constructs and therefore stress that more weight should be given to the identification and assessment of these relevant components. Taking these factors together, a clear need to design a new, encompassing questionnaire to measure cognitive and affective empathy and its subcomponents emerged.

This research introduces the Questionnaire of Cognitive and Affective Empathy (QCAE) and reports the reliability and factor structure of this new questionnaire before verifying it in an independent sample. As males consistently score lower on self-reported empathic functioning than females (Baron-Cohen & Wheelwright, 2004; Jolliffe & Farrington, 2006), gender differences for performance on the QCAE were examined. Convergent validity was examined by looking at its relationship with another measure of empathy, the BES. Theoretically, the QCAE and BES both assess cognitive and affective empathy and therefore, a strong positive association between these scales would be expected.

The construct validity of the QCAE was examined by exploring its relationship with empathic anger, impulsivity, aggression, psychopathy, and Machiavellianism. Empathic anger, empathy experienced as anger on behalf of a victimized person, has been associated with the general concept of empathy and affective empathy in particular. "A concern for another's welfare, an emotional reaction to the feelings and plight of another, and an angry reaction on behalf of a victim of some injustice" (Vitaglione & Barnett, 2003) seem to rely on the ability to be sensitive to and vicariously experience the feelings of others. Positive relationships between empathic anger and both cognitive and affective empathy have therefore been predicted. The general tendency to respond quickly can result in inaccurate performance, which can be a source of difficulty (Dickman, 1990). The more prominent this dysfunctional impulsive behavior, the less chance the person has to employ cognitive empathy. The ability to construct a working model of the emotional states of others involves cognitive processes that require time and impulsivity prevents the process of cognitive empathy from being successfully completed. A negative association between self-reported impulsivity and cognitive empathy would therefore be expected. Psychopathy can be considered one of the prototypical disorders associated with empathic dysfunction (Hare, Hart, & Harpur, 1991). Primary psychopathy is associated with emotional dysfunction as represented by callous unemotional traits, a lack of empathy, conning, manipulation, and a lack of remorse or guilt (Blair et al., 2005; Viding, 2004), and is predicted to show a strong negative relationship with empathic behavior. It is anticipated that this relationship would be strongest for affective empathy. Secondary psychopathy is characterized by an antisocial lifestyle and impulsivity. It has been postulated that people who offend and demonstrate antisocial behavior are less empathic than people who do not. Sharing and comprehending another person's emotions might be inhibiting and discouraging aggressive or antisocial behavior (Eisenberg, 2000; Jolliffe & Farrington, 2004; Spinella, 2005). We therefore expected empathy to have a negative relationship with aggression and

secondary psychopathy, reflected in a chronically unstable and antisocial lifestyle (Lynam, Whiteside, & Jones, 1999). The MACH-IV has been put forward as a global measure of psychopathy (McHoskey, Worzel, & Szyarto, 1998) and a negative association between Machiavellianism and empathic behavior was thus predicted.

METHODS

This research consists of two studies. Study 1 aimed to explore the factor structure of the QCAE and its construct validity. Study 2 aimed to verify the factor structure of the QCAE and examine its convergent validity. Both studies contributed to the examination of the relationship between cognitive and affective empathy and gender differences in empathic experience and behavior.

Participants

Male ($n_1 = 206$, $n_2 = 88$) and female ($n_1 = 434$, $n_2 = 230$) students of the University of Manchester (UK) and Manchester Metropolitan University (UK), as well as employees of these universities with a university email account, were recruited via a widely distributed email that provided information about the study and requested participation. The email included a link to a Web site that presented participants with detailed information about the study. Only individuals who declared to not have been treated for any psychiatric illness within the past year were allowed to proceed and gave informed consent online. The following demographic details were collected: gender, age, country of origin, and highest level of education achieved. The participants were then presented with several questionnaires (see later) in a fixed order. Study 1 took approximately 30 min to complete. Completion of Study 2 took 5 to 10 min. Completion of a study offered participants the possibility to enter a prize drawing. Ethical approval for the studies was granted by the University of Manchester Research Ethics Committee.

Materials

The QCAE was constructed to measure cognitive and affective empathy according to the definitions stated in the introduction. To benefit from the strength of validated questionnaires, the items of the QCAE were derived from the EQ (Baron-Cohen et al., 2003), the HES (Hogan, 1969), the Empathy subscale of the Impulsiveness-Venturesomeness-Empathy Inventory (IVE; Eysenck & Eysenck, 1978), and the IRI (Davis, 1983). Permission to use items from these questionnaires was obtained from the respective authors. We acknowledge that the BEES (Mehrabian, 2000) is a commonly used and validated measure that would fit in this list; however, the author did not grant us permission to explore the fit of its items for use in the QCAE and therefore, this questionnaire had to be excluded from this study. Each item within these questionnaires was rated by two authors (Birgit A. Völlm and Renate L.E.P. Reniers) as measuring either cognitive empathy or affective empathy according to the preceding definitions, or as measuring neither of these two constructs (e.g., sympathy). If both raters agreed that the item measured either cognitive or affective empathy, the item was included. In cases of disagreement or uncertainty items were discussed with a third author (Rhiannon Corcoran). On completion of this process, 65 items were identified as measuring either cognitive (29 items) or affective empathy (36 items) and

were included in the QCAE. Participants rated these items by indicating to what degree the statement applied to them using a 4-point Likert scale with the response options *strongly agree*, *slightly agree*, *slightly disagree*, and *strongly disagree*. The use of this 4-point Likert scale forced participants to make a choice, as the option of *neither agree nor disagree* was not available.

To assess the construct validity of the QCAE, 533 of the original 640 participants from Study 1 completed additional questionnaires.

The Trait Empathic Anger Scale (Vitagliano & Barnett, 1999) measures concern for another person's welfare, emotional reaction to the feelings and plight of another, and angry reaction on behalf of the victim of some injustice. The questionnaire consists of seven items and responses are made on a 5-point Likert scale.

The Barratt Impulsiveness Scale (BIS-11A; Barratt, 1994) consists of 30 items measuring impulsiveness on a 4-point Likert scale. The questionnaire encompasses three subscales: Cognitive Impulsivity, Motor Impulsivity and Non-Planning Impulsivity. Reduced attention, high motor activation, and decreased planning characterize impulsive behavior (Moeller et al., 2001).

The Impulsivity Inventory (Dickman, 1990) is designed to measure two types of impulsivity: dysfunctional and functional impulsivity. Dysfunctional impulsive behavior encompasses acts with little forethought when this forms a source of difficulty, whereas functional impulsivity benefits from this tendency for little forethought. The questionnaire consists of 23 items, 12 of which assess dysfunctional impulsivity and 11 of which assess functional impulsivity. Answers are indicated by a true or false response.

The Life History of Aggression questionnaire (Brown, Goodwin, Ballenger, Goyer, & Major, 1979) assesses diverse aspects of aggressive behavior, including aggression expressed toward others (verbal and physical assault) or toward inanimate objects (destruction of property), temper tantrums, antisocial behaviors involving disciplinary actions and illicit acts, and injury to self. Responses are made on a 5-point Likert scale. In this study, seven of the nine questions were used, as two questions do not apply to the general population.

The Short Expagg questionnaire (Campbell, Muncer, McManus, & Woodhouse, 1999) measures a person's view of his or her own aggression. Aggressive experiences can either be expressed in instrumental terms, viewing it as a socially functional means of exerting control over others' misbehavior, or in expressive terms, viewing it as a personal and regrettable loss of self-control (Driscoll, Campbell, & Muncer, 2005). Both types of aggression are measured using five questions each rated on a 5-point Likert scale.

The Levenson Self-Report Psychopathy Scale (Levenson, Kiehl, & Fitzpatrick, 1995) consists of 26 items answered on a 4-point Likert scale. The questionnaire assesses primary (16 items) and secondary psychopathy (10 items). Primary psychopathy is related to the core personality traits that are associated with psychopathy (Factor 1 of the Psychopathy Checklist-Revised [PCL-R]; Hare et al., 1991), whereas secondary psychopathy captures the behavioral manifestations of psychopathy (Factor 2 of the PCL-R).

The MACH-IV (Christie & Geis, 1970) consists of 20 items assessing the extent to which participants' views reflect a tendency toward Machiavellianism. Answers are rated on a 5-point Likert scale and specified in three subfactors: tactics (nine items), views (nine items), and morals (two items).

Out of the 318 participants in Study 2, 300 completed the BES (Jolliffe & Farrington, 2006), which consists of 20 items measuring cognitive (9 items) and affective empathy (11 items). Cognitive empathy is represented as the understanding of another's emotions, whereas affective empathy reflects affect congruence.

Data Analysis Strategy

Participants ($n = 640$) completed the 65-item version of the QCAE. Item scores were examined for normal distribution and in case of nonnormal distribution binary correction was applied. These data were subjected to principal components analysis (PCA; direct oblimin rotation with Kaiser normalization) using SPSS Version 14 (SPSS Inc., Chicago, IL) to develop a concise and coherent scale.

To validate these exploratory results, the proposed factor structure of the QCAE was tested on a new sample of 318 participants using CFA employing the AMOS 16.0 statistical software program (SPSS Inc., Chicago, IL). To deal with non-normally distributed indicators, items were combined into item parcels. A parcel represented the mean of item pairs or triplets assumed to be conceptually similar and psychometrically unidimensional (Hall, Snell, & Foust, 1999; Nasser & Wisenbaker, 2003). To ensure that the items within parcels were related to the same underlying construct, the pairs and triplets were chosen based on the results of the exploratory factor analysis in Study 1. Within each factor, the mean of the two highest loading items was taken as the first item parcel. The mean of the next two factor loadings became the subsequent parcel. This procedure was repeated until no more items remained. When only three items remained, all three were combined to make the final parcel for the factor.

CFA model fit was assessed using χ^2 goodness of fit test, the Bollen Stein Bootstrap test, root mean squared error of approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), root mean square residual (RMR), and Akaike's Information Criterion (AIC). See Byrne (2001), Hu and Bentler (1999), and Kline (1998) for details on the rationale for choosing these indexes and their limitations.

RESULTS

Participant Demographics

Participants ($n = 640$) completed the 65-item version of the QCAE of which 607 completed all items of the final 31-item version of the QCAE and 511 completed all questionnaires of Study 1. Study 2 was completed by 318 participants, of whom 300 completed all questions of the QCAE and BES. From both studies together, a total of 925 participants completed all questions of the QCAE. Gender and age of the participant groups are displayed in Table 1. An average of 81% of all participants indicated a country in Europe as their country of origin, of which an average of 79% specified the United Kingdom. Most participants, an average of 45%, indicated "A levels" as highest level of education achieved, followed by "degree" (37%), "professional qualification" (7%), and "GCSE's/O levels" (2%). The remaining 9% fell in the "other" category.

Males in Study 1 were significantly younger than the females in this study, $t(551) = -2.31$, $p < .05$, $d = 0.19$. In Study 2, males were significantly older than females, $t(123) = 2.86$, $p < .01$, $d = 0.38$. There was no significant difference in age between males and females when the groups were combined.

TABLE 1.—Participant demographics.

Study	No. of participants	Group Analysis	Gender		Age		Range
			Male	Female	<i>M</i>	<i>SD</i>	
1	640	EFA	206	434	23.70	7.84	17–65
1	511	Relationship QCAE: Other personality traits	166	345	23.25	7.32	17–63
1 + 2	925	Gender differences QCAE, relationship (sub)scales QCAE	284	641	26	9	16–65
2	318	CFA	88	230	30	11	16–64
2	300	Relationship QCAE - BES	88	212	29.55	10.6	17–59

Note. EFA = exploratory factor analysis; QCAE = Questionnaire of Cognitive and Affective Empathy; CFA = confirmatory factor analysis; BES = Basic Empathy Scale.

Principal Components Analysis

Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser–Meyer–Olkin value of sampling adequacy was .878, exceeding the recommended value of .6 (Kaiser, 1970, 1974) and the Bartlett’s Test of Sphericity (Bartlett, 1954) reached statistical significance ($p < .001$), supporting the factorability of the correlation matrix.

PCA revealed the presence of 10 components, with eigenvalues exceeding 1, explaining 19.0%, 8.9%, 6.4%, 4.1%, 3.5%, 3.0%, 2.8%, 2.7%, 2.6%, and 2.5% of the variance respectively. Both a scree test (Cattell, 1966) and a parallel analysis (Pallant, 2005) suggested that only the first five of these components represented nonrandom covariance in the data, so these five components were retained for rotation. Direct oblimin rotation was performed, yielding a solution with adequate simple

TABLE 2.—Pattern for coefficients.

Direct Oblimin Rotation of Five-Factor Solution for QCAE Items							
Item No.	Item No. in Final Version of QCAE	Item Content	Component 1 Perspective Taking (CE)	Component 2 Emotion Contagion (AE)	Component 3 Online Simulation (CE)	Component 4 Peripheral Responsivity (AE)	Component 5 Proximal Responsivity (AE)
q54	25	I can easily work out what another person might want to talk about.	0.736	−0.051	0.025	−0.041	−0.177
q55	26	I can tell if someone is masking their true emotion.	0.734	−0.033	0.089	−0.040	−0.189
q53	24	I can sense if I am intruding, even if the other person does not tell me.	0.689	0.016	−0.065	−0.038	0.073
q45	19	I am good at predicting how someone will feel.	0.650	−0.003	−0.086	−0.074	−0.266
q57	27	I am good at predicting what someone will do.	0.649	−0.029	−0.005	−0.119	−0.177
q46	20	I am quick to spot when someone in a group is feeling awkward or uncomfortable.	0.634	0.043	−0.123	0.036	0.032
q42	16	I can pick up quickly if someone says one thing but means another.	0.628	−0.041	−0.006	−0.063	0.079
q50	22	I can easily tell if someone else is interested or bored with what I am saying.	0.601	0.095	0.037	0.012	0.197
binary q38	15	I can easily tell if someone else wants to enter a conversation.	0.586	0.010	−0.053	0.083	0.298
q48	21	Other people tell me I am good at understanding how they are feeling and what they are thinking.	0.455	−0.142	−0.177	0.064	−0.393
binary q40			0.380	−0.151	−0.083	0.315	0.309
binary q64			0.199	0.118	0.021	0.076	0.075
q15	13	I am happy when I am with a cheerful group and sad when the others are glum.	0.010	0.692	0.019	0.000	−0.037
q17	14	It worries me when others are worrying and panicky.	0.021	0.686	−0.113	−0.012	−0.121
q10	9	People I am with have a strong influence on my mood.	−0.010	0.605	−0.046	0.110	−0.048
q9	8	I am inclined to get nervous when others around me seem to be nervous.	−0.141	0.532	−0.180	0.086	−0.196
q39			0.137	−0.380	−0.102	0.257	−0.119
binary q16			0.075	0.368	−0.131	0.063	0.088
q63			−0.043	−0.362	−0.300	0.106	−0.323
q51			0.111	0.287	−0.138	0.261	−0.165
binary q49			0.180	0.245	−0.023	0.157	0.033
q4	3	I try to look at everybody’s side of a disagreement before I make a decision.	−0.009	−0.001	−0.738	−0.145	0.025

TABLE 2.—Pattern for coefficients (*Continued*).

Direct Oblimin Rotation of Five-Factor Solution for QCAE Items							
Item No.	Item No. in Final Version of QCAE	Item Content	Component 1 Perspective Taking (CE)	Component 2 Emotion Contagion (AE)	Component 3 Online Simulation (CE)	Component 4 Peripheral Responsivity (AE)	Component 5 Proximal Responsivity (AE)
q7	6	Before criticizing somebody, I try to imagine how I would feel if I was in their place.	0.042	0.070	−0.704	−0.181	−0.167
q6	5	When I am upset at someone, I usually try to “put myself in his shoes” for a while.	0.054	0.031	−0.698	−0.149	−0.152
q61	30	I always try to consider the other fellow’s feelings before I do something.	−0.007	0.189	−0.689	−0.051	−0.038
q5	4	I sometimes try to understand my friends better by imagining how things look from their perspective.	0.117	−0.002	−0.654	−0.075	−0.136
q59	28	I can usually appreciate the other person’s viewpoint, even if I do not agree with it.	0.010	−0.044	−0.629	0.093	0.142
q1	1	I sometimes find it difficult to see things from the “other guy’s” point of view.	0.094	−0.311	−0.510	0.228	0.099
q62	31	Before I do something I try to consider how my friends will react to it.	0.002	0.272	−0.500	0.042	0.016
q44	18	I find it easy to put myself in somebody else’s shoes.	0.189	−0.002	−0.496	0.134	−0.118
q65	29	I usually stay emotionally detached when watching a film.	−0.052	0.031	−0.315	0.062	0.159
q60			−0.088	0.054	0.101	0.792	−0.001
q3	2	I am usually objective when I watch a film or play, and I don’t often get completely caught up in it.	−0.068	0.071	0.153	0.716	0.004
q12	11	I often get deeply involved with the feelings of a character in a film, play, or novel.	−0.057	0.192	0.032	0.595	−0.151
q43	17	It is hard for me to see why some things upset people so much.	0.030	−0.178	−0.245	0.436	−0.131
q41	7	I often get emotionally involved with my friends’ problems.	0.076	−0.144	−0.267	0.290	−0.054
binary q14			0.207	0.248	−0.013	0.260	0.106
q8			0.009	0.232	−0.031	0.221	−0.609
q52	23	Friends talk to me about their problems as they say that I am very understanding.	0.391	−0.077	−0.150	0.104	−0.458
q11	10	It affects me very much when one of my friends seems upset.	0.034	0.339	−0.077	0.212	−0.458
q13	12	I get very upset when I see someone cry.	0.034	0.406	0.061	0.255	−0.456
% variance explained			18.96%	8.87%	6.41%	4.13%	3.52%

Note. The values in bold face represent item loadings above .4. The corresponding items are included in the final version of the QCAE. AE = Affective Empathy; CE = Cognitive Empathy; QCAE = Questionnaire of Cognitive and Affective Empathy. The QCAE is copyrighted by the authors. Permission has been granted to Taylor and Francis to reproduce the item content.

structure (Thurstone, 1947), where components each have a number of strong loading items and all items load substantially on only one component (Table 2). Only items loading above .4 were included in the final scale. This final scale includes 6 items from the IRI (5 items measuring cognitive empathy, 1 item measuring affective empathy), 8 items from the IVE (all affective empathy), 15 items from the EQ (12 cognitive empathy, 3 affective empathy), and 2 items from the HES (both cognitive empathy). Cronbach’s α s (Cronbach, 1951) for the resulting five scales of raw scores were .85, .72, .83, .65, and .70, respectively.

The interpretation of the five components was consistent with the definitions as already stated, with Components 1 and 3 representing cognitive empathy and Components 2, 4, and 5 representing affective empathy.

Confirmatory Factor Analysis

The five-factor structure suggested by the PCA in the first study was tested using CFA in Study 2. Figure 1 schematically

presents the two models that were tested. Model 1 represents the first order structure of the QCAE and tested the item parcel loadings on the subscales of the QCAE. Model 2 represents the second order structure and in addition to Model 1, incorporated the loadings of the subscales on the hypothesized higher order cognitive and affective empathy scales. The double arrow between cognitive and affective empathy reflects their covariance.

Table 3 contains the model fit statistics for both models,¹ which revealed acceptable fit.

To further test the structural validity of the QCAE, Model 2 was tested for consistency across gender with regression weights, factor variances, and covariance held constant. Comparison of Model 2 for females and males to the model with equality constraints resulted in $\Delta\chi^2(101) = 111.137, ns$,

¹To solve the problem of a negative error variance in the second order model, the residual error variance of the peripheral responsivity factor was constrained to zero.

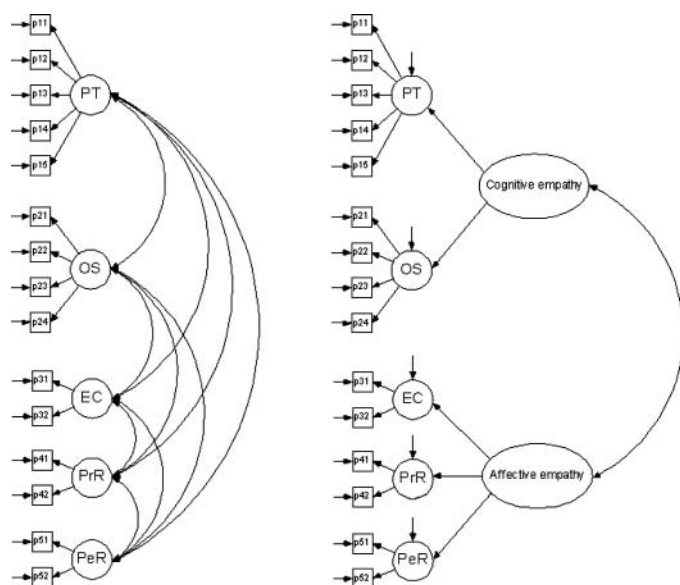


FIGURE 1.—Model 1 (left) and Model 2 (right) representing the first- and second-order structure of the Questionnaire of Cognitive and Affective Empathy. *Note.* Boxes represent observed variables (parcels) and circles represent latent factors. Long, solid arrows represent regressions. Short arrows represent residual error variances. The curved, double-headed arrows represent covariations. P21 = Parcel 1 of Factor 2, etc.; PT = perspective taking; OS = online simulation; EC = emotion contagion; PrR = proximal responsivity; PeR = peripheral responsivity.

indicating that all equality constraints hold across both genders. Model 2 is, therefore, concluded to be representative for the whole sample as well as the female and male samples separately.

Components of Cognitive and Affective Empathy

Close examination of the items that make up the five subcomponents revealed the common ground they shared. Subcomponent 1 involves intuitively putting oneself in another person's shoes to see things from his or her perspective and was therefore labeled *perspective taking*. An example of a question in this subcomponent is "I can easily work out what another person might want to talk about." Commonly, people want to talk about what concerns them, their thoughts and worries that have an apparent emotional component. This component relies strongly on our skills shared with ToM, however, for empathic perspective taking there is an emphasis on emotion processing. Subcomponent 3 was labeled *online simulation* and encompasses an effortful

attempt to put oneself in another person's position by imagining what that person is feeling. Online simulation is likely to be used for future intentions. An example question is "Before criticizing somebody, I try to imagine how I would feel if I was in their place." The first affective subcomponent was labeled *emotion contagion* and assesses the automatic mirroring of the feelings of others. An example item is "I am happy when I am with a cheerful group and sad when the others are glum." Subcomponent 5, *proximal responsivity*, addresses the responsiveness aspect of empathic behavior, illustrated by the affective response when witnessing the mood of others in a close social context. An example item is "It pains me to see young people in wheelchairs." Feeling these emotions might turn into feelings of sympathy, a response to the empathic experience presented as an urge to provide support and comfort to young people in wheelchairs. Subcomponent 4 is similar to proximal responsivity, but in a detached context and is therefore labeled *peripheral responsivity*. An example of an item is "I usually stay emotionally detached when watching a film."

Relationship Between Cognitive and Affective Empathy

Scores on the subcomponents or subscales of the QCAE were derived by summing the corresponding item scores. Summing the subscale scores for perspective taking and online simulation gives a cognitive empathy score. Summing the subscale scores for emotion contagion, proximal responsivity, and peripheral responsivity provides an affective empathy score. The sum of the cognitive and affective empathy scores provides the cumulative total empathy score.

Table 4 presents correlations between the scales and subscales of the QCAE for the 925 participants who completed all questions of the QCAE. The cognitive and affective empathy scales correlated moderately ($r = .31, p < .01$). The respective subscales demonstrated strong relationships, with the exception of the emotion contagion and peripheral responsivity subscales, which showed a weak correlation that likely reflects the distinct situational context these subscales reflect. Examination of the responses of female and male participants separately did not reveal significant differences between the correlations reported for the genders.

Gender Differences in Empathy

In the sample of 925 participants who completed all questions of the QCAE, females scored significantly higher than males. On the cognitive empathy scale, females had a mean of 59.42 ($SE = 0.3$), and males had a significantly lower mean of 56.12 ($SE = 0.5$), $t(495) = -5.63, p < .001, d = 0.41$. On the affective

TABLE 3.—Goodness of fit tests and indexes.

Goodness of Fit Measure	Value Indicating Good Fit	Model 1	Model 2
χ^2 goodness of fit	<i>ns</i>	$\chi^2(80) = 193.897, p < .001$	$\chi^2(85) = 244.309, p < .001$
Bollen Stein bootstrap	<i>ns</i>	$p = .001$	$p = .001$
RMSEA (90% CI)	$< .08$.067 (.055–.079)	.077 (.066–.088)
CFI	$> .9$ –.95	.947	.925
TLI	$> .9$ –.95	.930	.908
SRMR	$< .05$.030	.042
AIC	Smallest value	273.897	314.309

Note. RMSEA = root mean squared error of approximation; CI = confidence interval; CFI = Bentler's Comparative Fit Index; TLI = Tucker–Lewis Index, SRMR = standardized root mean square residual; AIC = Akaike's Information Criterion.

TABLE 4.—Relationships between (sub)scales of the QCAE.

		Cognitive Empathy				Affective Empathy			
		QCAE Total	Total	Perspective Taking	Online Simulation	Total	Emotion Contagion	Proximal Responsivity	Peripheral Responsivity
QCAE	Total	1							
Cognitive Empathy	Total	.87	1						
	Perspective Taking	.72	.85	1					
	Online Simulation	.75	.84	.44	1				
Affective Empathy	Total	.72	.31	.23	.29	1			
	Emotion Contagion	.45	.11	.05	.12	.76	1		
	Proximal Responsivity	.68	.39	.32	.33	.80	.46	1	
	Peripheral Responsivity	.54	.25	.20	.22	.73	.29	.41	1

Note. All correlations, besides the correlation between emotion contagion and perspective taking, reached significance at $p < .01$, one-tailed. QCAE = Questionnaire of Cognitive and Affective Empathy.

empathy scale, females had a mean of 36.76 ($SE = 0.2$) and males had a mean of 32.27 ($SE = 0.3$), $t(923) = -11.81$, $p < .001$, $d = 0.83$. These statistical differences also applied across all subscales.

Convergent Validity of the QCAE

The cognitive and affective empathy scores on the QCAE and BES showed strong positive correlations: $r = .62$, $p < .001$ for cognitive empathy; $r = .76$, $p < .001$ for affective empathy.

Construct Validity of the QCAE

Table 5 shows correlations of the QCAE with scores on questionnaires assessing empathic anger, impulsivity, aggression, psychopathy, and Machiavellianism. Significant differences between cognitive and affective empathy in relationship to these theoretically relevant measures were identified for moderate and strong correlations. Cognitive empathy showed a significantly stronger negative relationship with dysfunctional impulsivity, $t(508) = -4.88$, $p < .001$, and secondary psychopathy, $t(508)$

$= -4.71$, $p < .001$, than did affective empathy. Affective empathy correlated significantly stronger with empathic anger, $t(508) = -2.76$, $p < .05$, and expressive aggression, $t(508) = -2.83$, $p < .01$, than cognitive empathy. Correlations with total and primary psychopathy did not differ significantly for cognitive and affective empathy. No significant differences between these correlations were reported for the genders separately.

DISCUSSION

A 31-item questionnaire assessing cognitive and affective empathy has been developed and verified in a large sample of university students and employees. Exploratory factor analysis was used to identify five high internally valid subscales: perspective taking, online simulation, emotion contagion, proximal responsivity, and peripheral responsivity. The first two subscales measured cognitive empathy and the later three measured affective empathy. CFA verified this five-factor solution, which proved to be consistent across gender. The relationship between cognitive and affective empathy was examined and gender differences in

TABLE 5.—Correlation of the QCAE with theoretically relevant measures.

		Cognitive Empathy				Affective Empathy			
		QCAE Total	Total	Perspective Taking	Online Simulation	Total	Emotion Contagion	Proximal Responsivity	Peripheral Responsivity
Trait Empathic Anger		.41**	.27**	.24**	.22**	.40**	.30**	.34**	.30**
BIS-11A	Total	-.15**	-.21**	-.08	-.29**	-.04	.01	-.09	-.02
	Cognitive	-.11*	-.22**	-.11*	-.28**	.04	.08	-.02	.04
	Motor	-.09*	-.15**	.00	-.25**	-.02	.05	-.06	-.01
	Nonplanning	-.17**	-.18**	-.11*	-.22**	-.10*	-.06	-.12**	-.06
Impulsivity	Total	-.22**	-.20**	-.03	-.32**	-.18**	-.16**	-.14**	-.12**
Inventory	Functional	-.10*	.02	.13**	-.12**	-.20**	-.22**	-.12**	-.15**
	Dysfunctional	-.26**	-.33**	-.19**	-.40**	-.09*	-.03	-.12**	-.06
LHA		-.14**	-.13**	-.02	-.19**	-.10*	-.01	-.11*	-.10*
Short Exagg	Expressive	.29**	.17**	.10*	.18**	.31**	.26**	.29**	.19**
(aggression)	Instrumental	-.20**	-.14**	-.06	-.18**	-.21**	-.12**	-.11**	-.23**
Levenson	Total	-.41**	-.38**	-.24**	-.42**	-.30**	-.15**	-.29**	-.25**
Psychopathy	Primary psychopathy	-.38**	-.31**	-.18**	-.35**	-.35**	-.21**	-.32**	-.27**
Scale	Secondary psychopathy	-.29**	-.35**	-.24**	-.35**	-.12**	-.01	-.14**	-.14**
MACH-IV	Total	-.32**	-.26**	-.18**	-.26**	-.29**	-.15**	-.26**	-.25**
	Tactics	-.28**	-.23**	-.17**	-.23**	-.26**	-.15**	-.22**	-.24**
	Views	-.26**	-.23**	-.17**	-.22**	-.23**	-.11*	-.19**	-.23**
	Morality	-.11*	-.08	-.00	-.13**	-.12**	-.10*	-.18**	-.00

Note. QCAE = Questionnaire of Cognitive and Affective Empathy; BIS-11A = Barratt Impulsiveness Scale; LHA = Life History of Aggression Questionnaire.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

empathy were explored. Convergent and construct validity were also examined and as the observed relationships were in line with previous research and theoretical expectation, support for the validity of the QCAE was provided.

Relationship Between Cognitive and Affective Empathy

The cognitive and affective scales were moderately related to each other but had a strong relationship with their subscales. This suggests a relationship between cognitive and affective empathy, but at the same time emphasizes the distinction between these two types of empathy. Jolliffe and Farrington (2006) postulated that a high degree of emotional recognition facilitates both cognitive and affective empathy, but that being emotionally labile might only influence a person's affective empathy. This fits with suggestions that a deficit in affective empathy is prominent in psychopathy, whereas problems with cognitive empathy are associated with disorders on the autistic spectrum (Blair, 2005, 2008; Dziobek et al., 2008; Hansman-Wijnands & Hummelen, 2006; Rogers, Dziobek, Hassenstab, Wolf, & Convit, 2007), and highlights the QCAE as a valuable assessment tool. Cognitive and affective empathy comprise different and specific components as suggested by the moderate relationships among the five subscales of the QCAE. In concert these components contribute to empathic experience and behavior.

Model 2 (CFA) was shown to be consistent across genders and no statistically significant gender differences were reported for the relationships between the (sub)scales of the QCAE. This confirms that the QCAE can reliably be used in both genders.

Gender Differences in Empathy

Females scored significantly higher on all measures of empathy than males. These results are consistent with the literature in that females have been found to be more empathic than males (Baron-Cohen & Wheelwright, 2004; Jolliffe & Farrington, 2006). Gender differences have also been found in psychiatric disorders associated with lack of empathy, such as psychopathy and antisocial personality disorder (Strand & Belfrage, 2005; Yang & Coid, 2007), and the observed differences in empathy might have an underlying importance for these gender differences. Using the QCAE in these psychiatric populations might provide more insight into this.

Convergent Validity: Relationship Between QCAE and BES

The strong correlations between the QCAE and BES present evidence of convergent validity. Theoretically, the QCAE and BES both assess cognitive and affective empathy and therefore, a strong positive relationship between those scales was predicted. Indeed, the cognitive and affective scores of the two questionnaires were strongly related to each other.

Construct Validity of the QCAE

To test the construct validity of the QCAE, performance on the questionnaire was related to measures of empathic anger, impulsivity, aggression, psychopathy, and Machiavellianism in a large sample of the participants. In line with prediction, cognitive empathy showed a significantly stronger negative relationship with dysfunctional impulsivity than affective empathy. As impulsive acts are quick and unplanned, dysfunctional impulsive behavior

might prohibit any rational consideration of appropriate action that would be based on cognitive empathic skills.

In addition, cognitive empathy showed a significantly stronger negative relationship with secondary psychopathy than affective empathy. It has been suggested that cognitive empathy is relatively unimpaired in psychopathy (Blair, 2005) as, for example, shown by intact performance on the "Reading the Mind in the Eyes" task (Dadds et al., 2006), a task frequently used to measure cognitive empathy (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). This implies that individuals with psychopathic personality might be able to describe what another person might be feeling; however, they might not share or care about these feelings (Dadds et al., 2009). This emotional impairment is suggested to lie at the core of the impaired decision-making capabilities of individuals with psychopathic personality (Shirtcliff et al., 2009) and could negatively affect cognitive abilities such as taking another person's perspective or simulating his or her feelings to construct a more complex working model of that person's emotional states. Difficulties in identifying oneself with the emotions of other people might be present. These difficulties could be strongly enhanced by the impulsive lifestyle and poor behavioral controls present in individuals with high levels of secondary psychopathy (Blair et al., 2005; Viding, 2004). Correlations with total and primary psychopathy did not differ significantly for cognitive and affective empathy, reflecting equally strong relationships between both types of empathy and the callous and unemotional behavior associated with the primary component of psychopathy.

Affective empathy, on the other hand, showed a significantly stronger relationship with empathic anger than cognitive empathy. A concern and emotional reaction to another person's feelings, as well as an angry reaction on behalf of a victim of injustice, rely on our sensitivity and responsiveness to the feelings of this other person (Vitaglione & Barnett, 2003). Vicariously experiencing these feelings could easily develop into feelings of empathic anger.

Affective empathy also correlated significantly stronger with expressive aggression than cognitive empathy. Individuals with high levels of affective empathy show increased sensitivity to the feelings of others and could, in certain situations, become overwhelmed by these feelings, which might in turn disallow rational consideration of appropriate action and put these individuals at risk of losing control and becoming aggressive (Campbell et al., 1999). When reflecting on their own aggression, individuals with high levels of affective empathy might view it as a regrettable loss of self-control.

The relationships between cognitive and affective empathy and the theoretically relevant measures employed for assessing the construct validity did not significantly differ between female and male participants. Therefore, construct validity has been demonstrated across genders.

Incremental Validity

The design of our studies means that the incremental validity of the QCAE over the BES in predicting criterion such as psychopathy and aggression could not be demonstrated statistically. The additional value of the QCAE, however, is demonstrated by the multidimensionality of the questionnaire. By assessing cognitive as well as affective empathy, the QCAE distinguishes itself

from commonly used empathy measures. Importantly, cognitive and affective empathy are composed constructs themselves. The QCAE uniquely identifies these components, thereby providing direct assessment of empathy's underlying mechanisms. Furthermore, the new and clear definitions of cognitive and affective empathy, together with the more stringent statistical approach, provide a significant improvement in addition to the use of measures such as the BES.

Limitations and Future Directions

The items of the QCAE were derived from widely used and validated questionnaires, thereby building on their strengths. This approach, however, does limit the ability to compare the QCAE to these questionnaires because the scales partially overlap. Comparison of the QCAE to additional empathy questionnaires not used for its construction will provide further information on the convergent validity of this measure. In addition, important statistical evidence for incremental validity of the QCAE could be acquired by comparing the predictive value of the QCAE for criterion such as psychopathy and aggression to that of alternative empathy measures.

The studies are Web-based and this might have had important implications. Self-selection bias could have influenced which individuals took part in these studies (Eysenbach, 2005). Individuals with an interest in social sciences, and more specifically empathy, high levels of altruism, or those who were simply tempted by the prize drawing, might have been more likely to complete the studies. This might have been reflected in the lower number of male participants in comparison to the female groups. However, by distributing the recruitment e-mail among students and employees of all disciplines and backgrounds, we hope to have limited this effect as much as possible.

It should be noted that participants could have participated in both studies, leading to overlap in study samples. To minimize overlap between the samples, 1.5 years were kept between the start of the two studies. Although conducting the research online did enhance control over the order in which the questionnaires were completed, it did reduce control over the environment in which participants completed the questionnaires (Kraut et al., 2004). However, research has shown that questionnaires administered via the Internet are reliable and are answered in the same way as when they are administered via traditional mailed paper questionnaires (Ritter, Lorig, Laurent, & Matthews, 2004; Riva, Teruzzi, & Anolli, 2003). Therefore, the fact that the QCAE is the first empathy questionnaire to be administered online could be considered a strength in that it offers the opportunity for online assessment of self-reported levels of empathy. Empathy is regarded as a favorable trait and participants might have been tempted to respond in a more socially desirable way. The anonymity of the online approach could, however, have reduced response bias. Importantly, the studies were highly efficient by allowing recruitment of large samples at low marginal costs (Kraut et al., 2004; Riva et al., 2003).

Two separate data sets for the exploratory and confirmatory factor analyses were used in this study and this increases confidence in the results reported here. The large number of participants recruited, the wide age range, and the wide range of questionnaires completed for validation purposes added additional strength. However, participants were recruited from a university student and employee sample, which makes it difficult to

generalize the results to the greater population. This stresses the importance of replicating this research in different population samples. Because the QCAE demonstrated holding strong relationships with clinically relevant personality traits characteristic of a criminal population, validation of the QCAE in this group would be of great interest.

Although empathic personality traits can be measured by personality questionnaires such as the QCAE, it is not known whether empathy scores predict performance in the real world. Future research should aim to determine whether performance correlates with self-reported levels of cognitive and affective empathy as measured by the QCAE. The use of reports by significant others would be a valuable addition to this. Relationships with treatment progress should be investigated to determine the predictive validity of the QCAE. This could significantly contribute to our understanding of the underlying mechanisms of disorders associated with empathic dysfunction and have direct and significant effects on treatment development and secondary prevention.

CONCLUSION

New definitions of cognitive and affective empathy were constructed and a new questionnaire assessing these empathic components was developed. Reliability and factor structure of the QCAE were explored and consecutively verified. Females showed significantly higher levels of empathy than males. Furthermore, convergent and construct validity were demonstrated. The QCAE, therefore, seems to be a valid tool for assessing cognitive and affective empathy. Future studies are required to replicate and extend the reported results to consolidate the position of the QCAE as a measure of cognitive and affective empathy.

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APPENDIX

QUESTIONNAIRE OF COGNITIVE AND AFFECTIVE EMPATHY (QCAE) SCORING KEY

Items are rated on level of agreement using a 4-point Likert scale with the following response options: 4 (*strongly agree*), 3 (*slightly agree*), 2 (*slightly disagree*), and 1 (*strongly disagree*).

Scoring of the (sub)scales of the QCAE

Empathy (Sub)scale	Item Numbers
Cognitive empathy	
Perspective taking	15, 16, 19, 20, 21, 22, 24, 25, 26, 27
Online simulation	1 (r), 3, 4, 5, 6, 18, 28, 30, 31
Affective empathy	
Emotion contagion	8, 9, 13, 14
Proximal responsivity	7, 10, 12, 23
Peripheral responsivity	2 (r), 11, 17 (r), 29 (r)

Note. (r) indicates that the item is reverse scored.

The subscale items are summed to produce the scores on the subscales. The two cognitive subscales are summed to produce the score on the cognitive empathy scale and the three affective subscales are summed to produce the affective empathy score. The sum of cognitive and affective empathy scores provides the cumulative total empathy score.

The items of the QCAE originate from the Interpersonal Reactivity Index (IRI; Items 1–6), Impulsiveness Venturesomeness Empathy Inventory (IVE; Items 7–14), Empathy Quotient (EQ; Items 15–29), and Hogan Empathy Scale (HES; Items 30–31).