

BI Norwegian Business School - campus Oslo

# GRA 19502

Master Thesis

Component of continuous assessment: Thesis Master of Science

Affective Empathy and Emotional Contagion - A look into theory and critique of measurement scales

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Start: 02.03.2018 09.00

Finish: 03.09.2018 12.00

# Master Thesis

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– *Affective Empathy and Emotional Contagion - A look into theory and critique of  
measurement scales* –

Hand-in date:  
03.09.2018

Campus:  
BI Oslo

Examination code and name:  
**GRA 19502 Master Thesis**

Program:  
Master of Science in Leadership and Organizational Psychology

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## Abstract

Positive, negative and neutral emotional expressions transfer information about feelings, and attitudes towards other people. In organizations with high interaction among humans, emotion research is becoming increasingly important. Emotional contagion processes are relevant in micro-level, within and between-person factors, however, it is also relevant in macro-level, group and organizational processes, influencing organizational outcomes. Further, understanding how individual differences such as empathy affect people's susceptibility to emotional contagion is of great advantage when working with people and understanding human interaction. Therefore, having appropriate measurements for concepts such as emotional contagion and empathy are of great importance. This article demonstrates that when measured with validated and often used scales, such as the Susceptibility to Emotional Contagion scale (ECS; Doherty, 1997) and Basic Empathy Scale (BES; Jolliffe & Farrington, 2006), susceptibility to emotional contagion and affective empathy are not measuring distinct constructs. Moreover, analyzing measurement of such constructs and the items used in correspondence to established definitions of these construct reveal interesting results. By adding items reflecting positive emotions to the measurement of affective empathy, one may actually capture more of the construct than how it is measured in already validated scales. We call for consistent use of definitions as well as re-evaluation of scales used. Moreover, we point to the necessity of research on the mechanisms behind emotional contagion and empathy to obtain a more complete understanding of the timeline and processes of these constructs for further development of measurements that measure what they say to measure.

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***Affective Empathy and Susceptibility to Emotional Contagion - A  
look into theory and critique of measurement***

**Introduction**

Perception and expression of emotion are an integral part of interactions among humans (Schulkin, 2004; Decety & Jackson, 2004). Humans like other animals use bodily expressions to voluntarily or involuntarily communicate various type of information to their surroundings (Decety & Jackson, 2004). Therefore, understanding other people's emotional expressions as well as one's own, may have clear adaptive advantages in social relations and for facilitation of own well-being. With open office work spaces and free seating, many companies are opening up for more human collaboration and interaction at work. Thus, making emotion research increasingly important for individuals to understand and detect when and how they are adopting other's emotions, as well as, when their emotions are being captured by others.

Have you ever experienced that a whole meeting has changed atmosphere because of the attendance of a stressed manager or an unhappy customer? Or that after meeting with an overworked colleague, you feel dreaded or tired? Or have you maybe ever experienced that after seeing two colleagues laughing together, you feel like smiling?

This phenomenon is often conceptualized as emotional contagion and has over the last decade been highlighted and investigated by numerous researchers. Emotional contagion and emotions are today recognized as crucial variables for individual behavior and organizational functioning. Moreover, as "empathy is essential to our comprehension of social behavior, to our regulation of our own behavior, and to the acquisition of morality" (D'Ambrosio, Olivier, Didon, & Besche, 2009, p. 160), it is a concept of great importance when studying transfer of emotion. Empathy may be fundamental when trying to get a better comprehension of how emotions transfer from one person to another. Therefore, in this article we will focus our attention on important constructs, such as, emotional contagion and empathy.

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Much disagreement among researchers in the field of empathy and emotions have resulted in inconsistent research findings, making it difficult to get a thorough understanding of the mechanisms and processes behind empathy and emotional contagion. Additionally, the inconsistent use of definitions of empathy and emotional contagion has had a considerable negative impact on measurement and development in research and practice within the field (Cuff, Brown, Taylor, & Howat, 2016; Gerdes, Segal, & Lietz, 2010; Baldner & McGinley, 2014). Getting a full understanding of the processes of empathy and emotional contagion therefore becomes complicated and incompatible and seems to be further mirrored in self-report measurement.

Self-assessment scales often used to assess constructs such as emotional contagion and empathy may in fact be capturing the same, or similar constructs. Many of these scales seem to deviate from the many definitions used and may not capture the whole extent of the components. Therefore, it is vital to shed light on these measurement issues to encourage researchers to pursue a universal understanding of the mechanisms behind such constructs. In this way, it will be possible to build scales that capture all the right elements of each construct. As per now, the definitions of empathy and emotional contagion are diverse and assorted, evidently affecting the self-assessment scales which may not be able to capture the right elements within a construct, seemingly ending up measuring the same thing.

In this article we find it important to argue for and shed light on the issues limiting commonly used scales such as the Basic Empathy Scale (BES) measuring affective and cognitive empathy (Jolliffe and Farrington, 2006) and the Emotional Contagion Scale (ECS; Doherty, 1997) measuring susceptibility to emotional contagion. It is evident that there are theoretical differences between emotional contagion and affective empathy, however, we will in the following article argue that the wording of items in these scales does not actually portray the definitions used for the concepts. Based on research, these two scales should be related, but also have clear distinctions for being two distinct constructs. As we intend to highlight the importance of clarifying problems with scales used assessing these concepts the first aim of this article will be to; (a) investigate whether a

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measurement of affective empathy (in this case the BES) and the susceptibility to emotional contagion scale (ECS) are in fact measuring distinct constructs.

Another very important issue to shed light on is how measurements of empathy such as the BES and IRI (Davis, 1983) fail to incorporate items representing positive emotions for the affective empathy component. The Susceptibility to Emotional Contagion Scale involves both negative and positive emotional items (Doherty, 1997) (see Appendix A for full list of questions). Further, the cognitive empathy component of the BES (or the perspective taking in the IRI) include items with positive, negative and neutral emotions. However, the affective component of the BES only has negative or neutral emotional items. Also, the items for empathic concern in the IRI (Davis, 1980;1983) only includes negative or neutral emotional items. As research evidently do not support affective empathy as a component only activated by negative emotions, why is it that when measuring affective empathy, one excludes items reflecting positive emotions? Therefore, the second aim of this article is; (b) to investigate if there will be an increase in the relationship between the affective empathy component of the BES and the ECS when adding positive loaded items to the affective component of the BES.

As long as research remains scattered without a guiding framework within the area of emotions and empathy, its contribution to the field of affect and human interaction will be minimal (Salovey & Mayer, 1990). The literature on emotional contagion and empathy has evolved from disparate research perspectives and methods, leading researchers to assess these concepts in different ways and under different labels. This fragmentation hinders a coherent knowledge base and makes it difficult to advance further within the field. Therefore, before getting into the main aim of this article, we will provide a small review of where research is regarding emotional contagion and empathy. Further, we will present a critical analysis on some of the tools used to assess emotional contagion and the affective component of empathy (based on the BES and ECS), particularly arguing for the problems around items wording. For extensionality purposes, a deeper incorporation of the cognitive component is left for future research.

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## Theory

### *Emotional Contagion*

Hatfield, Cacioppo, and Rapson (1994) define emotional contagion as “the tendency to automatically mimic and synchronize facial expressions, vocalizations, postures, and movements with those of another person and, consequently, to converge emotionally” (p. 5). Scientists, writers and other artists have historically observed that people tend to mimic mental and bodily expressions of emotions, postures, physiological states and movements of others. Emotional contagion has the power to influence a wide range of organizational outcomes. Emotions and emotional contagion are recognized as crucial variables influencing individual behavior and organizational functioning (Vijayalakshmi & Bhattacharyya, 2012). Thus, an understanding of this concept is expected to help facilitate for healthier emotional awareness and management in organizations (Vijayalakshmi & Bhattacharyya, 2012).

Emotional contagion has been identified to influence individual’s thoughts, feelings and behaviors, as well as group functioning (La Coco et al., 2014; Barsade, 2002). Managers’ and leaders’ moods have been recognized by researchers to have an impact on followers’ and work groups’ moods (Barsade & Knight, 2015; Ashkanasy & Humphrey, 2011; Haver, Akerjordet, & Furunes, 2013; Gooty, Connely, Griffith, & Gupta, 2010). Emotional or mood contagion is a process that induces a mood state through public observations of a person’s mood display (Sy, Côté, & Saavedra, 2005). Therefore, emotional contagion is as much relevant for contagion of emotion among colleagues as well as for the leader-follower or follower-leader relationships (Sy & Choi, 2013).

Understanding the process and the mechanisms of in which leader’s mood influence their followers, or in which colleagues’ emotions influence each other is critical in organizational behavior research.

Research in the area of emotions and emotional contagion in the workplace is important for followers and leaders to be aware and to learn strategies for how they can best manage their own and other people’s emotions. Therefore, having measurement tools that measure what they say to measure is essential for

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researchers and organizations to get a better comprehension of this topic. Each individual within the workplace may experience different moods and emotions depending on how their colleagues are displaying their emotions. A study by Sy, Côté, and Saavedra (2005) on self-management groups found that the moods of leaders are transferred to other group members, supporting the claim of emotions being an important aspect of healthy work relationships. Further, individuals with leaders in a positive mood experienced more positive moods after interacting with their leader. These discoveries are consistent with findings of other researchers supporting the notion of emotional contagion (Sy & Choi, 2013; Tee, 2015; Ashkanasy & Humphrey, 2011). According to Rajah, Song, and Arvey (2011), in their review on emotionality and leadership, emotional contagion presents itself as a main mechanism in the relationship between emotions and leadership.

#### *Mechanisms behind Emotional Contagion*

Even though the contagious nature of emotions is well supported, it is unclear however, the processes behind emotional contagion. Given that individuals unintentionally tend to imitate emotional expressions by another person, it is reasonable that this imitation results in a congruent emotional experience in the observer as a way of feedback mechanism (Neumann & Strack, 2000). It is suggested that emotional contagion is driven by motor imitation (i.e., mimicry), or that it is one observable aspect of the emotional state arising when we see corresponding emotions in others (Tamietto et al., 2009). Thus, emotional contagion is argued to operate non-consciously and continuously through different bodily expressions (La Coco et al., 2014). Despite the knowledge about emotional contagion, the only available scale developed to measure this construct is the Emotional Contagion Scale (Doherty, 1997) which assess a person's susceptibility to emotional contagion. In this article we will investigate whether this scale is in fact measuring a distinct construct from affective empathy.

The mechanisms behind emotional contagion is still somewhat unclear and may facilitate for difficulties in understanding the process and for designing appropriate scales. Shamay-Tsoory (2011) suggests that the mirror neuron system (MNS) of the brain, which is a subset of multimodal neurons, is activated when an individual observes another's actions. Moreover, the MNS has also been found to

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be an active part of affective empathy suggesting that there are two paths to emotional contagion (1) emotional contagion based mainly on unconscious motor and autonomic mimicry and possibly (2) emotional experience and feedback based on complex neurological processes (Shamay-Tsoory, 2011). However, whether emotional contagion is composed of these two processes are unclear as these two procedures may actually be (1) emotional contagion as an unconscious motor mimicry and (2) affective empathy as a conscious neurological process. As emotional contagion is continuously defined as emotional mimicry happening deliberately and unconsciously, another person's emotions may not actually be thoroughly understood. Moreover, emotional contagion may be caught and expressed in a manner characteristic of the particular explicit emotion (La Coco et al., 2014).

Neuroimaging studies have attempted to investigate what brain regions are at play during emotional contagion processes. Baastiansen, Thioux, and Keysers (2009) argue that experiments using neuroimaging show that humans activate common routes when observing emotions felt by others as well as when experiencing these ourselves. Moreover, a pattern of activity in our brains that embodies another's affective state are associated with witnessing someone experiencing an emotion. The same authors discuss that given the evidence on emotions as shared through multiplex of motor, somatosensory, and affective reactions to other people's emotions, may be expected to differ in condensed ways. Therefore, investigating brain activity during emotional contagion processes is of importance for developing a comprehension of the processes and timeline behind emotional contagion.

For a better comprehension of emotional contagion, we need to understand more of the factors that are at play, as well as the factors that may infer in the process. Research point to relevant individual differences to which persons are affected by others' emotional expressions (La Coco et al., 2014). Moreover, the authors argue that, genetics, gender, personality characteristics and early experiences have been brought up to explain these differences. Individual factors such as self-esteem, emotional stability, cognitive load, stress, gender, and the big five personality

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factors may all be important for the investigations in relation to the understanding of the concept.

Hatfield, Rapson, and Le (2009) found that regulation of emotional contagion processes explains how people authentically empathize with one another, and how much they chose to be influenced by others' emotions. There may be many factors behind the process of emotional contagion. However, how these factors operate, which factors are most prevailing, and how the processes of emotional contagion work, remains unclear. This is further evident in the measurement scale used. Further development may be held back due to a lack of knowledge in relation to the mechanisms behind emotional contagion which again may be reflected in the lack of items catching the important factors that distinguish emotional contagion from other related constructs.

### *Empathy*

Empathy has been a popular concept the last few decades and have evolved to numerous definitions and interpretations. A current definition incorporating important aspects of the concept is provided by Cohen and Strayer (1996) "the ability to understand and share in another's emotional state or context" (p. 988). Jolliffe and Farrington (2004, 2006) particularly support this definition as it inclusively encompasses the acknowledgments that empathy is both a cognitive process (i.e. the ability to understand another person's emotions) and an affective capacity (i.e., feeling with others).

Empathy is a popular construct, with a diverse number of definitions. Jolliffe and Farrington (2004) argues that empathy is thought to exist and vary between individuals and is therefore often viewed as an individual difference factor. Furthermore, they cover how it is implicit within all research on empathy that it is a construct in which have influence on behavior which means that those with higher levels of empathy are often expected to act in a more responsive way to the feelings of others. McCrae and Costa (1997) argue that empathy is an ability that combines thinking and feeling and is thereby distinguished from personality traits. Moreover, empathy is often understood as involving the comprehension and experience of other's emotions (Kellett, Humphrey, & Sleeth, 2002).

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Empathy is often recognized as a key variable for several behaviors and concepts. Salovey and Mayer (1990) propose that empathy is central to emotional intelligent behavior where emotional intelligence is attributed to the set of skills that contribute to accurate appraisal and expression of emotion in oneself and others. The measurement and conceptualization of emotional intelligence is another highly discussed topic within the academics, following disagreements in conceptual overlap and the objective determination of correct responses to test items (Lindebaum, 2009). Further, empathy is often credited as essential for leadership and for managing relations (Kellett, Humphrey, & Sleeth, 2002; Yukl, 1998). Research is continuously proposing the importance of empathy in relations to others, our everyday communication, and our survival in a social environment (Fan, Duncan, de Greck, & Northoff, 2011). Therefore, it is often believed that people high in empathy may have obvious advantages in developing quality relations with other people and points to the importance of the concept in relation to emotion research.

### *Cognitive and Affective Empathy*

Distinguishing empathy into two types: cognitive and affective empathy may be important to get a better understanding of the concept. According to Besel and Yuille (2010) cognitive empathy is the imaginatively understanding of another person's actions, thoughts and feelings. While affective (emotional) empathy is when someone is feeling the emotions of other people, but maintaining a compassionate, other-focused perspective.

Moore, Dev, Jeste, Dziobek, and Eyer (2015) argue that empathy is a multidimensional construct composed of cognitive and affective empathy as two components. Cognitive empathy is defined as the ability to explain, predict, and interpret another person's emotional expression accurately (Decety, Norman, Berntson, & Cacioppo, 2012). Affective empathy is linked to the capacity of sharing emotions with others (feeling with others) and the mechanisms in which one monitor the distinction between one's own and another person's feelings (Eisenberg & Fabes, 1990).

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By allowing the use of diverse definitions of the same construct, measurement and further understanding of the mechanisms and influences of affective and cognitive empathy becomes conflicting. Additionally, the use of diverse definitions creates problems when comparing results and research that supposedly are investigating the same construct. Gaining a common understanding and advancement within the field thereby becomes problematic and inconsistent. In order to create measurement scales that actually measure what they say to measure, a common understanding of these constructs needs to be practiced. Moreover, we will need a better comprehension of what mechanisms and brain regions are at play during the processes to develop such scales.

### *Mechanisms behind Cognitive and Affective Empathy*

The distinction between cognitive and affective empathy is not only driven by theory, extensively support of this distinction has been found through a considerable body of research (Moore et al., 2015; Cuff et al., 2016; Asada, 2015; Decety, 2011; Fan et al., 2011; Zaki, Bolger, & Ochsner, 2008). Gaining a more comprehensive understanding of how these two mechanisms work together and/or separate is therefore of great interest. According to Buck, Powers and Hull (2017) there is evidence that cognitive and affective empathy can be doubly dissociated neurologically, that is, each can be influenced separately and independently of the other.

The mechanisms behind empathy is still uncertain and literature points to diverse results related to what brain regions are at play during empathic processes. Studying brain lesions, Shamay-Tsoory, Aharon-Peretz, and Perry (2009) found that cognitive and affective empathy are dependent on different neuroanatomical substrates. Uzefovsky et al. (2015) found that affective empathy was solely associated with oxytocin receptor, whereas cognitive empathy was solely associated with arginine vasopressin receptor 1a. Uzefovsky and colleagues (2015) found no interaction among these two genes. Baldner and McGinley (2014) points to the importance of understanding what mechanisms are at play in order to create measurements that actually measure what they say they measure. In their investigation on currently used empathy-scales they found that,

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particularly cognitive empathy, was scarcely understood and was thereby not measured appropriately through commonly used empathy scales.

Affective empathy has been connected to the human MNS which includes the inferior parietal lobe and the amygdala (Uzefovsky et al., 2015; Shamay-Tsoory, 2011). The MNS is activated when we are experiencing an emotion and when the “other” experiences the same emotion (Uzefovsky et al., 2015) and has also been found to be activated during emotional contagion processes (Shamay-Tsoory, 2011). Nummenmaa, Hirvonen, Parkkola and Hietanen (2008) found in their fMRI study on neural systems for affective and cognitive empathy that affective empathy facilitates somatic, sensory, and motor representation of other individual’s mental states. Further, it leads to a more vigorous mirroring of observed bodily expressions and mental states than that of cognitive empathy.

It is important to emphasize that during normal empathic processing, both systems (affective and cognitive empathy) are activated simultaneously (Schnell, Bluschke, Konradt, & Walter, 2011; Zaki & Ochsner, 2012; Uzefovsky et al., 2015). In a quantitative meta-analysis on core neural networks in empathy, Fan and colleagues (2011) found that affective and cognitive empathy activate differential regions in the brain, however, they also activate regions conserved between them. Their results support the central roles of bilateral AI and dACC-aMCC-SMA in empathy. They further identified the midbrain, right DMT, right anterior insula and right dACC as activated during affective empathy, the left anterior insula as activated during both affective and cognitive empathy, and the left OFC, left aMCC and left DMT as activated during cognitive empathy. It is important to note that Fan et al. (2011) did not find consistent finding for activation of the MNS regions, suggesting that the MNS is not centrally involved in empathy.

Neuroimaging studies as well as self-report research is pointing to diverse results when trying to explain empathic processes. For advancement in the field, a consensus on the brain regions and mechanisms activated during cognitive and affective empathy is of great importance. Further neuroimaging studies needs to be conducted in order to support or disregard previous findings. A further understanding of the concepts and a facilitation of a more thorough understanding

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of what similarities and distinctions existing is essential for future development of scales measuring affective and cognitive empathy.

### ***Emotional Contagion and Affective Empathy, Same or Different?***

#### *Similarities and Distinctions*

The similarities and distinctions among these constructs are incorporated differently from researcher to researcher. Some researchers argue that emotional contagion is one of the mechanisms of affective empathy (Lim & Okuno, 2014). Some argue that emotional contagion is a precursor for empathy (Asada, 2015; Shamay-Tsoory, 2011). Moreover, other researchers argue for clear distinctions among these two concepts due to the conscious nature of empathy and unconscious mechanisms of emotional contagion as well as the self-other distinction within empathy that emotional contagion may not incorporate (Vijayalakshmi & Bhattacharyya, 2012; Cuff, Brown, Taylor, & Howat, 2016; Decety & Jackson, 2004). Further, as previously discussed, neuroimaging studies are showing to somewhat diverse results not giving a consensus to what mechanisms in the brain are at play during affective and cognitive empathy as well as during emotional contagion.

Empathy is often discussed as being highly relevant in emotional processes. Research suggests that empathic individuals mimic more (Hofelich & Preston, 2012; Sonnby-Borgström, 2002), are better at decoding emotions that are being expressed by an individual (Zaki et al., 2008), and exhibit more neural resonance when observing an individual's pain (Singer et al., 2004). Further, Tee (2015) suggests that individual differences in empathy influence facial mimicry reactions. Sonnby-Borgström, Jönsson, and Svensson (2003) argues that individuals high in empathy display immediate, automatic, facial mimicry reactions. Moreover, they emphasize how this same effect was not apparent in individuals low in empathy. Empathic accuracy (Dimberg, Andréasson & Thunberg, 2011), and individual sensitivity to facial feedback processes (Andréasson & Dimberg, 2008) were also influenced by differences in empathy (Tee, 2015). Tee (2015) also suggests that empathic individuals were found to be more sensitive and more accurate in assessment of others' facial emotions.

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Emotional contagion and empathy are constructs both connected to the crossover of emotions. Härtel and Page (2009) emphasize that recent research tends to support emotional contagion rather than empathy as a causal mechanism of crossover processes. Vijayalakshmi and Bhattacharyya (2012) expresses that it is commonly believed that susceptibility to emotional contagion is depended on personality traits within each individual. Moreover, they see empathy as an individual factor that may have an impact on a person's susceptibility to emotional contagion. Asada (2015) writes that emotional contagion does not require reasoning opposed to affective and cognitive empathy. Furthermore, Asada (2015) see emotional contagion and affective empathy as two different constructs. Moreover, emotional contagion is expressed as being an early, automatic, unconscious process, fundamental for later empathy-related mental states. Singer and Lamm (2009) support Asada's (2015) notion of different constructs when expressing that mimicry and emotional contagion are regarded as important, yet distinct and neither necessary nor sufficient processes for the experience of empathy.

Therefore, for a better understanding and advancement of this topic, it is important to investigate if the scales that should be measuring these constructs, are in fact, measuring different constructs. Following what Vijayalakshmi and Bhattacharyya (2012) suggest, affective empathy should be one factor associated with susceptibility to emotional contagion; however, scales measuring these constructs should still be distinct as there may be other individual factors involved. On the other hand, if accepting Asada (2015) and Singer and Lamm's (2009) position, scales such as the ECS and the affective empathy component of the BES should not be highly correlated as they suggest that affective empathy is a distinct process from emotional contagion and happens later on a timeline.

Lim and Okuno (2015), have a different perspective on empathy and emotional contagion. They divide empathy into emotional contagion i.e. "I feel what you feel" and advanced cognitive perspective-taking i.e. "I understand what you feel" proposing that emotional contagion is a part of the processes behind empathy. Similarly, Prochazkova and Kret (2017) see emotional contagion as a precursor of empathy. Moreover, they argue that emotional contagion is an important factor of

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the development of empathy where mimicry of physiological and motor feedback induces emotions in the receiver which further helps the observer to understand the sender's emotions. Moreover, they argue that cognitive empathy precedes mimicry, which means that people psychologically appraise the social context before deciding to empathize and display mimicry. If that would be the case, a scale measuring susceptibility to emotional contagion should be more closely associated with cognitive empathy than affective empathy which does not seem to be the case, at least when considering the ECS and the BES.

The items used for the ECS are relatively similar to the items used for the affective empathy components in the BES. As distinct scales, measuring distinct construct, the face validity may thereby be rather low. The items used for both scales are lacking consistency towards their definitions which further may lead to the fact that two different concepts are measured in similar ways.

#### *Item Wording in Measurement Scales*

Items used in scales measuring these constructs are lacking important distinctions in item wording. Nummenmaa et al. (2008) suggest that it is important to emphasize that emotional reactions often occur rapidly and involuntary, whereas understanding someone else's emotional states often requires voluntary effort and active mentalizing. In the BES, IRI, and ECS, which are commonly used and verified scales measuring emotional and cognitive empathy (BES, IRI) and susceptibility to emotional contagion (ECS) there are no items incorporating intention or consciousness in the measures of affective empathy in the same way that there are no items incorporating intention and/or unconscious acts in the ECS. Future research may investigate how this could be possible. After a thorough evaluation of literature, and many inconsistent reporting of the processes behind emotions and the timeline of these processes, we hypothesize that, if there is a clear distinction between affective empathy and emotional contagion in theoretical terms, this difference is not being captured by available scales (e.g. the BES and the ECS which will be used in this study).

The BES is built on Cohen and Strayer's (1996) definition "as the understanding and sharing in another's emotional state or context" (p. 523) where affective empathy is seen as affective congruence and cognitive empathy as understanding

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of another's emotions. Based on their definition and how these concepts are conceptualized by researchers, we question the item wording used in questions such as item 22; "I get frightened when I watch characters in a good scary movie" measuring affective empathy, as we would argue that the emotion asked for here is not an observed adopted emotion. Whether, a person would be frightened or not may also be dependent on their cognitive investment in the situation. Or, item 41; "I am not usually aware of my friend's feelings" measuring cognitive empathy, as being aware of, and understanding are two very different things. Being aware that your friend might be feeling sad or happy, does not necessarily mean that it is being understood.

Doherty (1997) based the ECS on the definition presented by Hatfield et al. (1994) "a tendency to automatically mimic and synchronize expressions, vocalizations, postures, and movements with those of another person's and consequently, to converge emotionally" (p. 5). Based on this definition, we question item wording such as item 17; "listening to the shrill screams of a terrified child in a dentist's waiting room makes me feel nervous", as this item talks to experience that may not be relevant for all, and it does not involve one emotion that are being adopted as it is. The same argument is relevant for item 14; "I sense my body responding when the one I love touches me." Item 12; "I tense when overhearing an angry quarrel", and item 11; "I melt when the one I love holds me close", are also items that does not include converging an observed emotion to one's' own as what is emphasized in the definition. And, item 10; "watching the fearful faces of victims on the news makes me try to imagine how they might be feeling" is relating to perspective taking rather than emotional contagion.

### ***Emotional Contagion, Empathy, and Negative/Positive Emotions***

To create measurement tools that measure what they say to measure, a better understanding of the concepts of emotional contagion, affective empathy and cognitive empathy is needed. Mapping out how emotions converge and the mechanisms behind these constructs is of great importance for a comprehension of how humans interpret and are affected by different types of emotions. Further, it is

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valuable to investigate how these processes evolve in relation to different emotions and the degree of such emotions. Current research agrees that empathic processes and emotional contagion happen both in relation to negative and positive emotions. There is some disagreement though, in relation to whether empathic processes and emotional contagion are more prevalent and happen faster for some emotions than others, and also whether there are some differences in relation to diverse emotions among the constructs. However, it is important to point out that on a general sense all processes are identified to be in play for positive and negative emotional displays.

Researchers have for many years in different settings investigated whether empathy and emotional contagion work differently when exposed to dissimilar emotions. In Deng and Hu's (2018) study on emotional mimicry, social appraisal and contagion of anger and happiness, they found that both emotions of anger and happiness was successfully converged among humans. Moreover, they found that mimicry of happy emotions is more likely than that of angry faces as angry faces often are implying something threatening and antagonistic. Deng and Hu (2018) found that angry contagion was affected by social appraisal and happy contagion coexisting with emotional mimicry. The reasoning behind this finding was that compared to happiness, which has rapid and effortless response, we attend to angry faces with more attention and cognitive resources to figure out and fight against the potential threats. This evolutionary advantage may explain why angry contagion uses more energy consuming social appraisal than happy contagion. Further, Westman, Shadach and Keinan (2013) found that when comparing crossover (contagion) of negative and positive emotions, a relative dominance for positive over negative crossover was found. Moreover, in the same study they found that positive crossover was stronger for high state empathy respondents compared to low empathy respondents.

Previous research also suggests that as well as converging both positive and negative emotions, individuals can experience empathy towards other people's well-being as well as other people's suffering (Scott, Colquitt, Paddock, & Judge, 2010; Nezlek, Feist, Wilson, & Plesko, 2001; Gable, Reis, Impett, & Asher, 2004; Eisenberg & Fabes, 1990). According to Baldner and McGinley (2014) empathy

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as it is defined, involves both positive and negative emotions. Harada, Hayashi, Sadato, and Iidaka (2016) studied neural correlates of emotional contagion, and in their behavioral data they found no significant difference in the magnitudes of empathy elicited by happy and sad facial expressions. Fredrickson's (2001) broaden and build theory argues that positive emotions broaden people's sense of self to also include others and thereby enhance individual's identification with others (Vaugh & Fredrickson, 2006). Evidently both positive and negative emotions seem to converge among people as well as positive and negative emotions are relevant in empathic processes.

La Coco et al. (2014) found a significant relationship between affective empathy (empathic concern, measured using the IRI) and the specific factor of anger/fear in their model of the Emotional Contagion Scale (ECS) (Doherty, 1997). Additionally, they found no significant relationship between affective empathy (empathic concern) and any of the positive affect factors (happiness and love) in their study. La Coco et al. (2014) study suggest a possible higher correlation between affective empathy and negative affect, specifically anger. However, we bring to attention the possibility of lack of relationship between positive affect factors and the affective empathy scale (or empathic concern) to be due to a lack of positive items in the affective empathy measure of the IRI, which are also missing in the BES. In other words, with no items measuring positive emotions, how then can we expect to find a significant relationship between affective empathy and positive affect factors? Consistently, we suggest that with no support from research highlighting that affective empathy only accounts for negative emotions and not for positive emotions, results of using this scale could in fact be different if the measure of affective empathy would provide items reflecting positive emotions.

Despite these findings suggesting that positive and negative emotions are involved both in emotional contagion and in empathic processes, Baldner and McGinley (2014) found a trend in empathy questionnaires for the retained factors to center on the experience, expression, and observation of mostly negative emotions and environments. It is surprising that empathy questionnaires often have more negative emotion items than that of positive emotion items as researchers typically

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do not explicitly define empathy to only occur in harmful or “threatening” environments or with only negative emotions. Therefore, we suggest that the addition of positive items to questionnaires such as the Basic Empathy Scale (Jolliffe and Farrington, 2006) are important to better capture the whole of the affective empathy construct.

### ***Measure of Affective Empathy and Susceptibility to Emotional Contagion***

Humans are able to put emotions into words, allowing us to report our emotions as well as express them (Decety & Jackson, 2004). Supposedly, these reports are to provide opportunities to get a greater understanding of human emotion, and also give the opportunity to share and explain different emotional experiences with each other (both current and past emotional experiences).

### ***Self-Report measure of Empathy***

The great interest in empathy and its measurement have been popular the past years. There are developed numerous of different definitions of the construct, which is further mirrored in multiple of dissimilar self-report empathy measures. Unfortunately, these scales differ in number of subscales and potentially differ in the degree to which they correspond to the definition of empathy (Baldner & McGinley, 2014). Baldner and McGinley (2014) found in their study that current empathy scales do not measure the same constructs. Also, too many of the scales overlap with the distinct construct, sympathy (Eisenberg & Strayer, 1989; Jolliffe & Farrington, 2006; Baldner & McGinley, 2014). Another problem identified is the lack of consensus when measuring cognitive empathy as well as disagreement in how to measure affective empathy. Baldner and McGinley (2014) found in their study that the affective empathy scale in BES may per today be the most accurate measurement for the construct. Therefore, to measure level of affective and cognitive empathy within subjects in this analysis we will investigate the use of the already validated Basic Empathy Scale (BES) developed by Jolliffe and Farrington (2006). To further measure our subjects’ level of susceptibility to emotional contagion and to be able to distinguish whether the measures used for affective empathy and emotional contagion are in fact measuring different constructs, we used the already validated and only scale developed to measure the

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construct, the Susceptibility to Emotional Contagion Scale developed by Doherty (1997)

### ***Basic Empathy Scale (BES)***

Designed and validated by Jolliffe and Farrington (2006), the BES has been used as a measure for cognitive and affective empathy in numerous of different studies (Carré et al., 2013; Ang & Goh, 2010; D’Ambrosio, Olivier, Didon, & Besche, 2008; Peschorro, Kahn, Gonçalves & Ray, 2017; Villadangos, Errasti, Amigo, Jolliffe, & García-Cueto, 2016; Svetieva & Frank, 2015) and has continuously proven to be a reliable measurement. Carré et al. (2013) revised the structure of the 20 items of the BES to investigate if the scale also would be valid for adults, since Jolliffe and Farrington (2006) administered their study in a sample of adolescents. Carré et al. (2013) suggested that the BES-A “now provides a brief assessment of empathic functioning in teenagers and adults” (p. 687). In addition, they suggested that the two-factor model proposed by Jolliffe and Farrington (2006) was a good fit for the scale.

The two-factor model of the BES has been proven a reliable and valid measure of empathy even when translated to other languages such as Spanish (Villadangos et al., 2016), Italian (Albiero, Matricardi, Speltri, & Toso, 2009) and Korean (You, Lee, & Lee, 2017) where the authors suggest that the BES “proved to be a reliable assessment tool for empathy in a Korean adolescent sample” (p. 1). This may suggest that the BES can be a reliable and valid measure across cultures, and not only in western cultures.

As previously discussed, based on previous research regarding empathy and positive and negative emotions, we find it questionable, that neither of the items measuring affective empathy includes positive emotions. Therefore, we added five positive worded items. These are elaborated later in the analysis.

### ***Self-Report Measure of Emotional Contagion***

#### ***Susceptibility to Emotional Contagion Scale (ECS)***

The only questionnaire developed for the purpose of measuring a person’s ability regarding contagious emotions, is the Susceptibility to Emotional Contagion scale

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(ECS) developed by Doherty (1997). The ECS is designed to measure people's susceptibility to catch emotions such as anger, fear, sadness, happiness, and love (All questions are portrayed in Appendix A). Doherty (1997) suggests that the Susceptibility to Emotional Contagion Scale is a reliable and valid scale that can be used in a wide variety of contexts. Research in the psychometrics involved in this scale "have confirmed the relevance of this instrument for the assessment of susceptibility to emotional contagion" (La Coco et al., 2014, p. 69). Lundqvist (2006, 2008) has demonstrated by factor analysis a five-factor structure and measurement invariance across gender and cultural groups. However, researchers have challenged the unidimensional model proposed by Doherty (1997) (Lundqvist, 2006; Gouveia, Gouveia, Guerra, Santos, & de Medeiros, 2007; Lundqvist & Kevrekidis, 2008; La Coco et al., 2014). The former ones proposed that a bi-factor model provided the best fit. Moreover, the suggested model was a 1 + 4 bifactorial model where susceptibility to emotional contagion was represented by a general factor and four specific factors representing happiness, love, sadness, and anger/fear as a combined factor. Therefore, the model proposed by La Coco et al. (2014) was a model with two variables for empathy. The empathic concern component of the IRI and the perspective taking component separately represented affective and cognitive empathy and the ECS representing susceptibility to emotional contagion. In their model, they suggested that empathic concern and perspective taking correlated within each other and with the ECS general factor. In addition, the two components of empathy also correlated with the specific factors. The model is displayed in in Figure 1.

As La Coco and colleagues (2014) were interested in the psychometrics of the ECS, they used empathy (perspective taking, and empathic concern measured by the IRI) as observed variables, considering the correlation between the scores of scores of empathy and the 1+4 model of ECS. An analysis with observed variables does not allow researchers to investigate the relationship among the items of the two scales. As a result, it might suggest a lower correlation between the two scales than what it actually could be. Therefore, we will attempt to investigate the relationship between empathy and emotional contagion using the same model as La Coco et al (2014), however, assessing affective and cognitive empathy as latent variables by using the items in the BES.

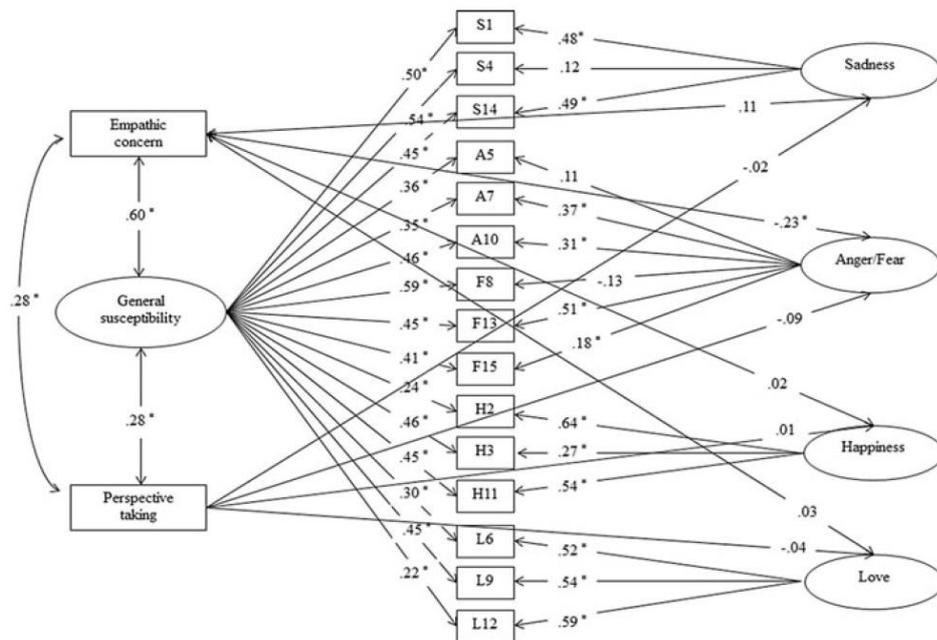


Figure 1. Model extracted from La Coco et al. (2014) p. 80. Instead of empathic concern and perspective taking, we will be using affective empathy and cognitive empathy. Our analysis will be based on latent variables rather than observed variables (as in this model).

In line with La Coco et al. (2014) we argue that to be able to assess individual differences for susceptibility to catching other’s emotions, researchers need reliable and valid instruments and we intend to support research by pointing to issues with existing measurement scales such as the BES and ECS.

### Hypotheses

Scholars disagree on the processes behind emotional contagion and empathy which makes it difficult to understand both processes and how they are distinct or related. This confusion might reflect in the scales used to measure these constructs. Moreover, we question whether important measures of affective empathy, such as the Basic Empathy Scale (Jolliffe & Farrington, 2006) or Interpersonal Reactivity Index (Davis, 1983), and emotional contagion, such as the Emotional Contagion Scale (Doherty, 1997) are indeed measuring different constructs.

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As previously suggested the first aim of this study will be to evaluate; (a) whether affective empathy and susceptibility to emotional contagion are in fact measuring two different constructs. Additionally, the second aim of this study is to question the absence of items representing positive emotions when measuring affective empathy by; (b) evaluating whether adding positive items will in fact modify the relationship between the AE component of the BES and the ECS.

**Hypothesis 1 (H1):** *The affective empathy scale in the BES and the ECS do not measure distinct constructs.*

Due to a lack of positive items in the affective empathy component measured by the BES, we propose that:

**Hypothesis 2 (H2):** *With the positive added items for affective empathy there will be a stronger relationship between affective empathy and the general factor of susceptibility to emotional contagion.*

Based on the theory discussed and our presented hypotheses we will investigate the relationship between affective empathy and the susceptibility to emotional contagion following La Coco et al.'s (2014) model provided in figure 1 (but excluding the cognitive empathy component). The model proposed by La Coco et al. (2014) is the only model available that investigates the relationship between emotional contagion as measured by the ECS and affective empathy. In their research they used the IRI questionnaire, instead, we will use the BES. Therefore, the model which will base our analyses will be as follows (for future reference we will refer to this model as Model 1):

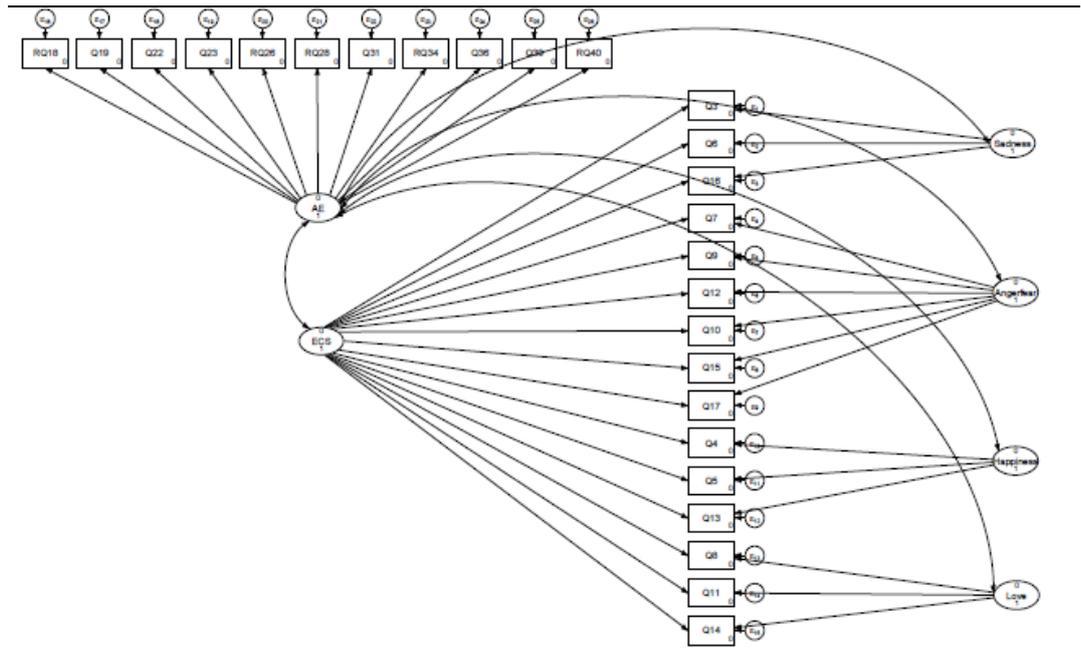


Figure 2. Model 1, containing the AE component of the BES explained by its 11 items plus the ECS 15 items including its specific factors of sadness, anger/fear, happiness, and love. In addition, the model suggests a correlation between AE and ECS general factor, and also a correlation between AE and the specific factors.

## Method

### *Participants*

The sample was made up of 283 participants with a wide variety in age. 29 percent of the respondents was between 18 and 24 years old, 52.5 percent was between 25 and 34, 9.6 percent was between 35 and 44, 4.8 percent was between 45 and 54, and 3.9 percent was between 55 and 64. Due to anonymity we did not assess the participants exact age and geographic placement. 62 percent of the respondents were women and, 38 percent were men.

### *Procedure*

Participants received an anonymous link to the internet questionnaire containing 42 questions where they were required to answer both the ECS and the BES scales as well as five added items for affective empathy to the BES scale. The scales used are described below. Participation was volunteer based, and respondents

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could withdraw from their participation at any time during the completion of the questionnaire. No compensation was given for participation.

## Measure

### *Affective and Cognitive Empathy:*

The Basic Empathy Scale (BES) is a 20-item questionnaire developed by Jolliffe and Farrington (2006) to assess basic levels of empathy. This scale contains two subscales of empathy: affective empathy and cognitive empathy. Affective empathy subscale is represented by items such as “after being with a friend who is sad about something, I usually feel sad” or “I get caught up in other people’s feelings easily” (Carré, Stefaniak, D’Ambrosio, Bensalah, & Besche-Richard, 2013). Further, cognitive empathy is represented by items such as “I am not usually aware of my friends’ feelings” or “I have trouble figuring out when my friends are happy” (Carré et al., 2013). All items are shown in Appendix A. We further added five items with positive emotions (directly translated from items already existing within the scale by including reverse emotions) to the measure of affective empathy. The added items were the following: “After being with a friend that is happy about something, I usually feel happy”; “I tend to feel enthusiastic when I am with friends that are excited”; “I do not become cheerful when I see people who are cheerful”; “I often become happy when watching nice things on TV or in films”; and “My friends’ happiness does not make me feel anything”.

### *Susceptibility to Emotional Contagion:*

The Susceptibility to Emotional Contagion Scale is a 15-item questionnaire proposed to assess “mimic tendency to five basic emotions (love, happiness, fear, anger, and sadness)” (Doherty, 1997, p. 149). The scale has three items representing each of the above mentioned basic emotions, namely; love, happiness, fear, anger and happiness. Examples of items proposed by Doherty (1997) are: “when I look into the eyes of the one I love, my mind is filled with thoughts of romance” (p. 136) assessing love, “when someone smiles warmly at me, I smile back and feel warm inside” (p. 136) assessing happiness, “I notice myself getting tense when I am around people who are stressed out” (p. 136), “it irritates me to be around angry people” (p. 136) for anger, and “if someone I am

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talking with begins to cry, I get teary-eyed” (p. 136) for sadness. All items are shown in Appendix A.

### **Data Analysis Approach**

In order to investigate hypothesis 1, suggesting that the AE scale of the BES and the ECS do not measure distinct constructs, we have conducted a series of Confirmatory Factor Analysis (CFA) on STATA version 15.1 with maximum likelihood estimation to evaluate the psychometrics properties of the models proposed. The next step was to run an Exploratory Factor Analysis (EFA) in Mplus version 8 to investigate the appropriate number of factors that would fit on a possible AE + ECS scale. The reason why we used Mplus for this analysis was due to the fact that Mplus provides goodness-of-fit values for EFA which would allow us to compare how well the factor solution fit the data. Following that, we ran a CFA on STATA to confirm the factor loadings and to be able to draw the Structural Equation Model (SEM). In addition, SPSS 25 was also used to facilitate the analysis of descriptive statistics and inter-item correlations.

For hypotheses 2, a similar procedure was adopted as we wanted to investigate if the correlation between the AE scale and the ECS general factor would increase when we added positive items. This could have been done by performing a CFA only; however, we investigated further to see whether a possible AE+ECS scale would show better goodness-of-fit with the items representing positive emotions. For this reason, same procedure mentioned above for hypothesis 1 was performed.

Diverse methods for goodness-of-fit were evaluated to try access which model would better fit the data. One of these methods was the Chi-Square ( $\chi^2$ ), which is a “measure of the deviance between the sample and the model covariance matrices” (Lundqvist, 2006, p. 265). Chi-Square, however, is very sensitive to sample size. Therefore, two other methods were used to evaluate goodness-of-fit for the estimated models. A second method used was the Root Mean Squared Error of Approximation (RMSEA) which is the discrepancy per degree of freedom of the model and data covariance matrices (Steiger, 1990). As Browne and Cudeck (1993) suggest, values ranging from 0.5 to 0.8 represent an acceptable fit to the model, and values below 0.5 are considered as close fit. One final measure of

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goodness-of-fit used was the Comparative Fit Index (CFI) which represents how much better the model fit in comparison to the null model, that is, assuming all indicators as uncorrelated (Bentler, 1990). In 1999, Hu and Bentler suggested CFI values equal to or higher than .95 to be adequate fit as opposed to the .90 suggested in 1980 by Bentler and Bonett. Therefore, we will consider that values ranging from .90-.95 suggest an acceptable fit to the model while the values above .95 suggest a close fit to the model. It is noteworthy that latent variables were standardized.

## **Results**

### ***ECS and Affective Empathy (AE) factor structure:***

As hypothesized (H1), we intended to investigate whether the AE component of the BES and the ECS are in fact measuring different constructs. Therefore, different CFAs were performed to evaluate whether there is a clear distinction between these measurements using the BES and ECS. Initially, we evaluated possible models based on the already established AE component of the BES. Secondly, we also evaluated the models with the five added items previously introduced. The first model evaluated was the previously mentioned Model 1 (built on La Coco et al., 2014), which contains AE as latent variable represented by 11 items and ECS general factor as latent variable represented by 15 items. These 15 items also represented the four specific factors of sadness, anger/fear, happiness, and love.

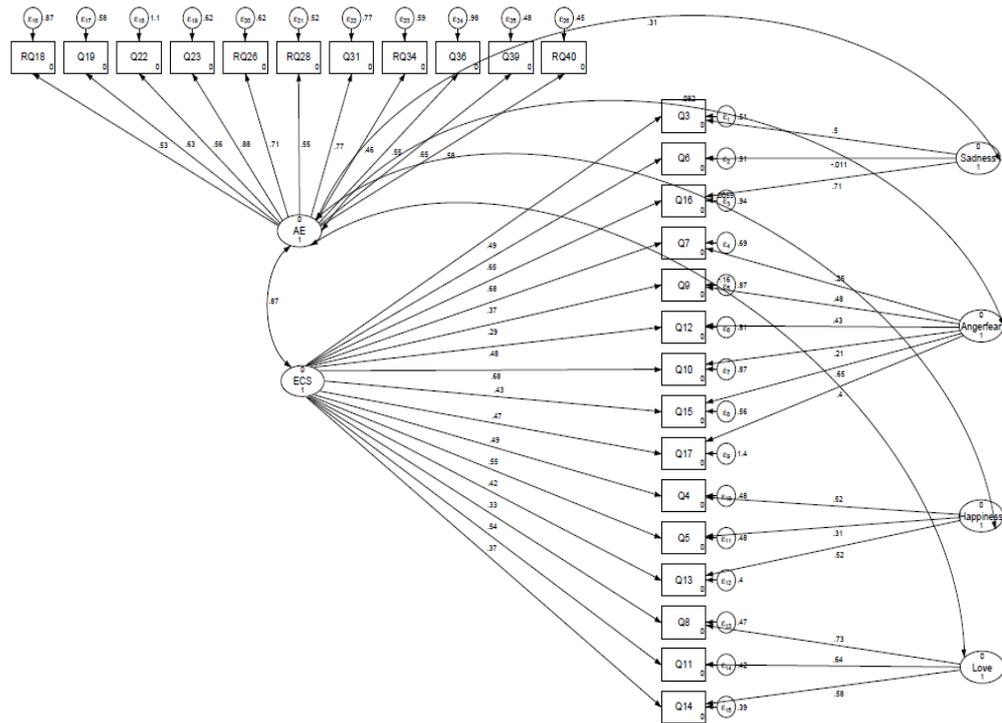


Figure 3. Model 1 factor loadings

The results of goodness-of-fit can be seen in table 3. Model 1 had non-satisfactory results. Despite having an acceptable fit according to the RMSEA, the CFI of .870 suggests that the model is not a good fit challenging the acceptability of this model. Another relevant point was the correlation between AE and ECS general factor which can be considered somewhat high (.87). Such a high correlation might indicate that these two variables are not measuring distinct constructs, supporting H1. In addition, it was found a significant relationship between AE and the sadness specific factor ( $r = 0.314, p < 0.001$ ) and, surprisingly, also a negative significant relationship with the love specific factor ( $r = -.155, p < 0.01$ ) while not having a significant relationship with anger/fear and happiness. This result would indicate that the AE component of the BES is sharing some variance with sadness and love specific factors. In other words, the AE scale would be related to an individual’s tendency to react to the specific emotions of sadness and love.

Following this initial analysis, as results did not show much statistical support for Model 1, we investigate an alternative model to find out whether it would have better goodness-of-fit than in the proposed Model 1. For the alternative model, we

considered La Coco et al. (2014) suggestion that there was only one significant relationship between AE and the specific factors of emotional contagion (anger/fear). Further, our analysis showed a relationship between only sadness, and love, specific factors. Finally, for this model, we have also considered that the AE component of the BES does not account for positive emotions, which harms the possible relationship with happiness and a positive relationship with love. Therefore, we suggested a model with alternative correlational paths. This way, the model we chose to analyze had AE only correlated with ECS general factor, and the specific factors correlated with each other. For a visual understanding, we provide Model 2 below:

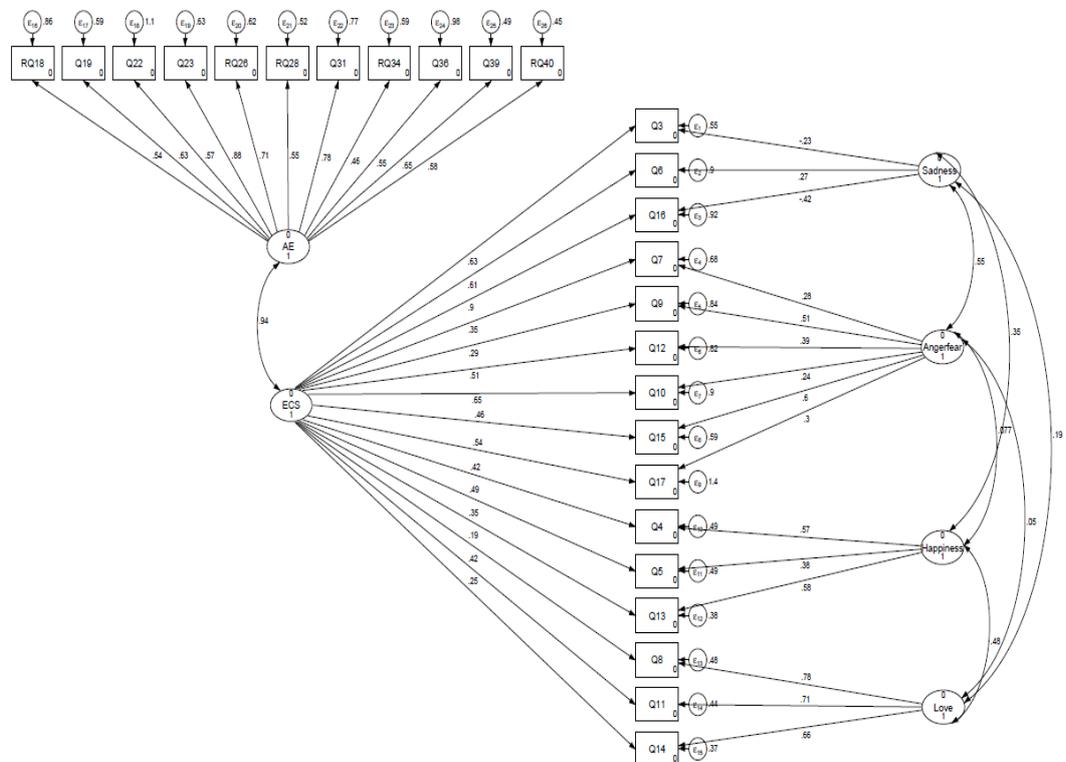


Figure 3. Model 2, containing the AE component of the BES explained by its 11 items plus the ECS 15 items including its specific factors. In this model, differently than Model 1, AE only correlates with ECS general factor, and the specific factors (sadness, anger/fear, happiness, and love) correlate with each other. Item names are as they appear in the questionnaire and can be seen in Appendix A.

As table 2 shows, regarding the RMSEA, Model 2 had slightly better results than Model 1. In Model 2, the RMSEA suggested an acceptable fit to the data while the CFI still suggested a poor fit to the data. However, one very interesting result

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can be seen in Model 2 and provides support for hypothesis 1. A correlation of .94 between AE and ECS general factor was found in this model. This increase from .87 to .94 in the correlation between AE and ECS general factor might suggest that when it is assumed that AE and the specific factors are correlated, they balance out the relationship between AE and the ECS general factor.

Further, after confirming that these models did not provide a good fit to the data, we continued our analysis by running an EFA on Mplus, followed by a CFA on STATA of all the items of the AE and ECS together. The results suggested a 5-factor model as the best fit for the data. Table 1 provides the factor loadings of each item after the EFA on Mplus. Based on this factor loading, we evaluated a 5-factor model consisting of sadness, anger/fear, happiness, love, and one factor we called general emotional contagion (Model 3). We also evaluated a 1+5 bifactorial model (Model 4) on STATA. This model consisted of a general factor of what we called affective empathy and 5 specific factors represented by the same 5 factors mentioned above. Model 3 already provided better results than Model 1, suggesting that the AE scale and the ECS would better explain the data as one scale with 5-factors. Further, as Table 3 suggests, Model 4 provided the best fit to the data, its RMSEA of .049 suggests a close fit to the data, and the CFI of .927 proposes an acceptable fit in accordance with the criteria used in this article (Model 4 is shown below). Therefore, the results of Model 4 suggest that making a combined scale with the AE items of the BES and the ECS items provide a better fit to the data than having it as two independent scales. Further, it suggests the existence of a general factor behind these items, once again providing support to our H1, namely; that these two scales are not measuring distinct constructs.

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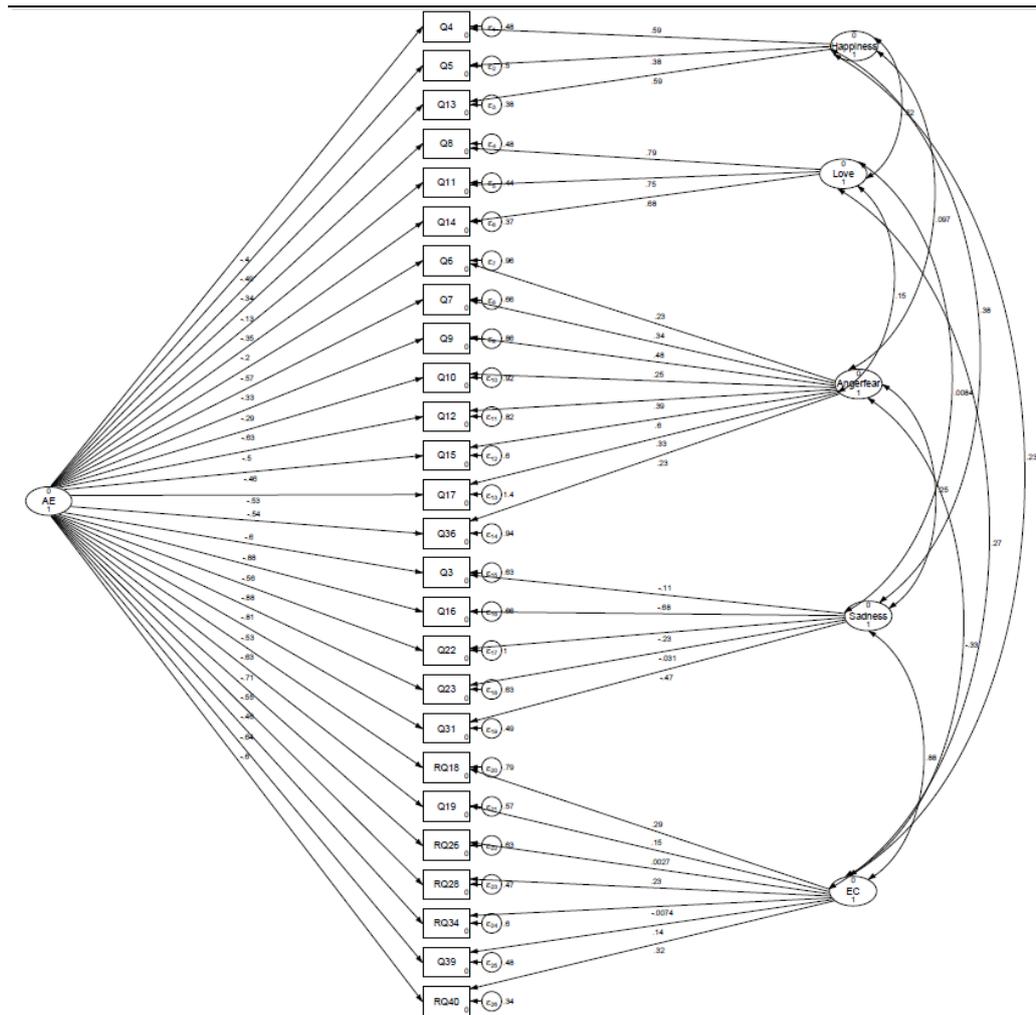
Factor loadings for Exploratory Factor Analysis with Oblique Rotation of the items of the AE component of the BES and the ECS items combined (\* significant at 5% level).

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	1	2	3	4	5
Q3				.429*	
Q4	.694*				
Q5	.417*				
Q6			.248*		
Q7			.431*		
Q8		.730*			
Q9			.554*		
Q10			.295*		
Q11		.745*			
Q12			.496*		
Q13	.601*				
Q14		.733*			
Q15			.784*		
Q16				.870*	
Q17			.386*		
Q18					.717*
Q19					.479*
Q22					.450*
Q23				.394*	
Q26					.391*
Q28					.626*
Q31				.778*	
Q34					.353*
Q36			.337*		
Q39					.447*
Q40					.746*

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Note. Factor loadings < .35 were taken out of the table. Exceptions are for the items with no loadings higher than .35. In these cases, we kept the highest loadings.



Model 4: Bifactorial 1+5 model with AE and ECS items together. In this model, AE represents a general affective empathy factor. The five specific factors are happiness, love, anger/fear, sadness, and EC (general emotional contagion).

Further, the factor loadings of the EFA, shown in Table 1, support H1 as it demonstrates that some items from the AE scale of the BES are clustered in the same factor as some items of the ECS. This suggests that they are measuring the same factor. In addition, the inter-item correlations observed in Table 4 also support that many items on one scale seem to have a high correlation with items from the other scale, suggesting that they are explaining similar (if not the same) factors. One example would be Q16; “I cry at sad movies” from ECS which has a high correlation with Q31 “I often become sad when watching sad things on TV or in films” (.642), and a considerably high correlation with Q23; “I get caught up in other people’s feelings easily” (.483) and Q26; “I don’t become sad when I see other people crying” (.429) from the AE component of the BES. Another example

is illustrated through Q3; “If someone I’m talking with begins to cry, I get teary-eyed” from the ECS which has its highest correlations with questions from the AE component of the BES (when excluding Q16; “I cry at sad movies”). Further, Q19; “After being with a friend who is sad about something, I usually feel sad” from the BES, which represents the AE component, has above average correlation with eight of the ECS items. These inter-item correlations support H1 by suggesting that some of the items from one scale could be considered in the same cluster as items from the other scale. These findings corroborate the findings on Table 2 that shows that some items from one scale load in the same factor of items from the other scale. In other words, the data suggests that some of the items in these two scales are measuring the same construct. This gives support for H1, suggesting that the AE component of the BES and the ECS are not measuring distinct constructs or factors.

Table 2 - Summary of goodness-of-fit values of CFA performed on different models

Models	$\chi^2$	RMSEA	CFI
Model 1	598.579 ***	.064	.870
Model 2	578.009***	.062	.878
Model 3	587.190***	.060	.879
Model 4	442.896***	.049	.927
Model 5	1023.017***	.072	.810
Model 6	1023.017***	.057	.885
Model 7	572.465***	.046	.932

\*\*\*  $p < .001$

Model 1: Original model, having AE correlate with ECS general factor and with each of the specific factors (sadness, anger/fear, happiness, and love).

Model 2: Same as model 1; however, AE correlates only with ECS general factor. The specific factors correlate with each other.

Model 3: 5- factor model consisting of all items in the AE component of the BES and the items of the ECS with all factors correlating with each other.

Model 4: 1+5 bi-factorial model consisting all items of the AE component of the BES and the items of the ECS. Model has one general factor (which we called affective empathy) and 5 specific factors which we called sadness, anger/fear, happiness, love, and general emotions.

Model 5: Same model as Model 1 but adding the items with positive emotions in the AE scale.

Model 6: 6-Factor solution of the possible AE+ECS scale with all factors correlating with each other and considering the positive added items.

Model 7: 1+6 bifactorial model consisting of a general factor and 6 specific factors. This model also consists all the items in the AE scale and ECS including the positive added questions.

### ***Evaluations with positively loaded added items***

Following the evaluations of the ECS and AE component of the BES as it is originally, we also evaluated the model fit with the five items added to the scale.

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This analysis was done to investigate whether introducing items representing positive emotions would reflect on changes in the data. As suggested in hypothesis 2 (H2), we predicted that adding items reflecting positive emotions to AE would increase the relationship between the AE component and the ECS. As we previously mentioned, the AE scale of the BES only consists of negative and neutral items. Further, there is no support in research to suggest that positive emotions should not be represented in an affective empathy questionnaire. Moreover, as we suggested earlier, there are strong similarities between the AE scale of the BES and the ECS, which contains positive items. Therefore, we believed that adding positive items to the AE scale would increase the similarities with the ECS, and consequently, the correlation. However, we did not find support for this hypothesis. The initial CFA performed showed results indicating that the relationship had a small decrease from .87 in Model 1 to .86 in the model with positive emotions (which will be called Model 5: Same as Model 1 but adding items with positive emotions to the AE scale) which is not a relevant change. However, when adding the items with positive emotions, we found a significant relationship between AE and the specific factor of happiness of the ECS ( $r = .182, p < 0.05$ ). As in the original model the relationship with sadness was still significant and with anger/fear still not significant. Another change was regarding the love factor which changed from being negative significant to a non-significant relationship. These results might suggest that the relationship between AE and ECS did not increase, as the relationship was balanced out by the significant relationship between AE and the specific emotion of happiness in the ECS.

As the goodness-of-fit goes, adding the items provided a worse fit to the data than the original model (Model 1), as it is demonstrated in Table 2. Therefore, differently than we predicted, not only the relationship did not show an increase, but adding the items also did not provide a better fit to the data based on the original model (Model 1). However, influenced by the results supporting that the AE component and ECS items are measuring a similar construct and counting with the support we found for H1, we performed an EFA on Mplus which indicated that a 6-factor model would best fit the data (the factor loadings can be

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seen in Table 3). An interesting result evident in Table 3 (basing on the factor loadings), and Table 4 (basing on the inter-item correlations), is that there were even more items from one scale loading in the same cluster as items from the other scale. This suggests that adding positive items made the scales even more similar, despite the small decrease in correlation and goodness-of-fit found in Model 5 (same model as Model 1 but adding the five positive items) in relation to Model 1.

Following the procedure used for H1, we then, turned to STATA to evaluate whether a 6-factor model (Model 6) or a possible 1+6 bifactorial model (Model 7) would provide a better fit to the data. Model 6 is a 6-factor model containing all items of the AE component of the BES and the ECS items plus the five positive emotion items we added to the AE component of the BES. This model suggests 6 factors explaining the data. The results, shown in table 3, suggest that the 6-factor model have an acceptable fit in regard to the RMSEA and the  $\chi^2$  while having a poor fit considering the CFI. The 6-factor model already provided a better fit to the data than Model 1 considering AE and ECS as correlated, but distinct constructs. This also suggests that the original model considering AE and ECS as two separate scales, does not have much statistical support. Further, Model 7, which is a 1+6 bifactorial model consisting of all the AE items of the BES and the ECS items plus the five added items. This model suggests the existence of a general factor and 6 specific factors which are happiness, love, sadness, anger/fear, and two other factors. Model 7 proved to be the model that best fit the data, including the 1+5 bifactorial model suggested earlier in this article (Model 5). As demonstrated in Table 2, results showed a close fit on the RMSEA (.046). The CFI was also improved in comparison to other models to .932, which suggests an acceptable fit based on the criteria used in this article. We believe that these results corroborate the findings supporting H1 that the AE component of the BES and ECS do not measure different constructs and also, that the addition of items reflecting positive emotions to a possible AE + ECS scale would provide a better fit to the data. However, it is important to notice that we are not suggesting that such a structure should be incorporated for neither of the scales or for a single

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united scale as it would contain a high number of items (31) for one construct, instead, we are aiming to shed light on issues with both scales.

Table 3

Factor loadings of Exploratory Factor Analysis with oblique rotation of the items of the AE component of the BES and the ECS items combining, including the 5 items reflecting positive emotions that were added to the questionnaire (\* significant at 5% level).

	1	2	3	4	5	6
Q3				.371*		
Q4	.668*					
Q5	.442*					
Q6		.290*				
Q7		.458*				
Q8			.739*			
Q9		.595*				
Q10						.298*
Q11			.737*			
Q12		.496*				
Q13	.735*					
Q14			.714*			
Q15		.703*				
Q16				.773*		
Q17		.403*				
Q18					.409*	
Q19					.376*	
Q20	.526*					
Q22				.484*		
Q23						.657*
Q24	.471*					
Q26				.373*	.353*	
Q27					.726*	
Q28					.464*	
Q31				.771*		
Q32	.537*				.389*	
Q34		.329*				
Q36		.340*				
Q38	.388*			.357*		
Q39						.629*
Q40					.617*	.359*

Note. Factor loadings < .35 were taken out of the table. Exceptions are for the items were there was no loadings higher than .35. In these cases, we kept the highest loadings.

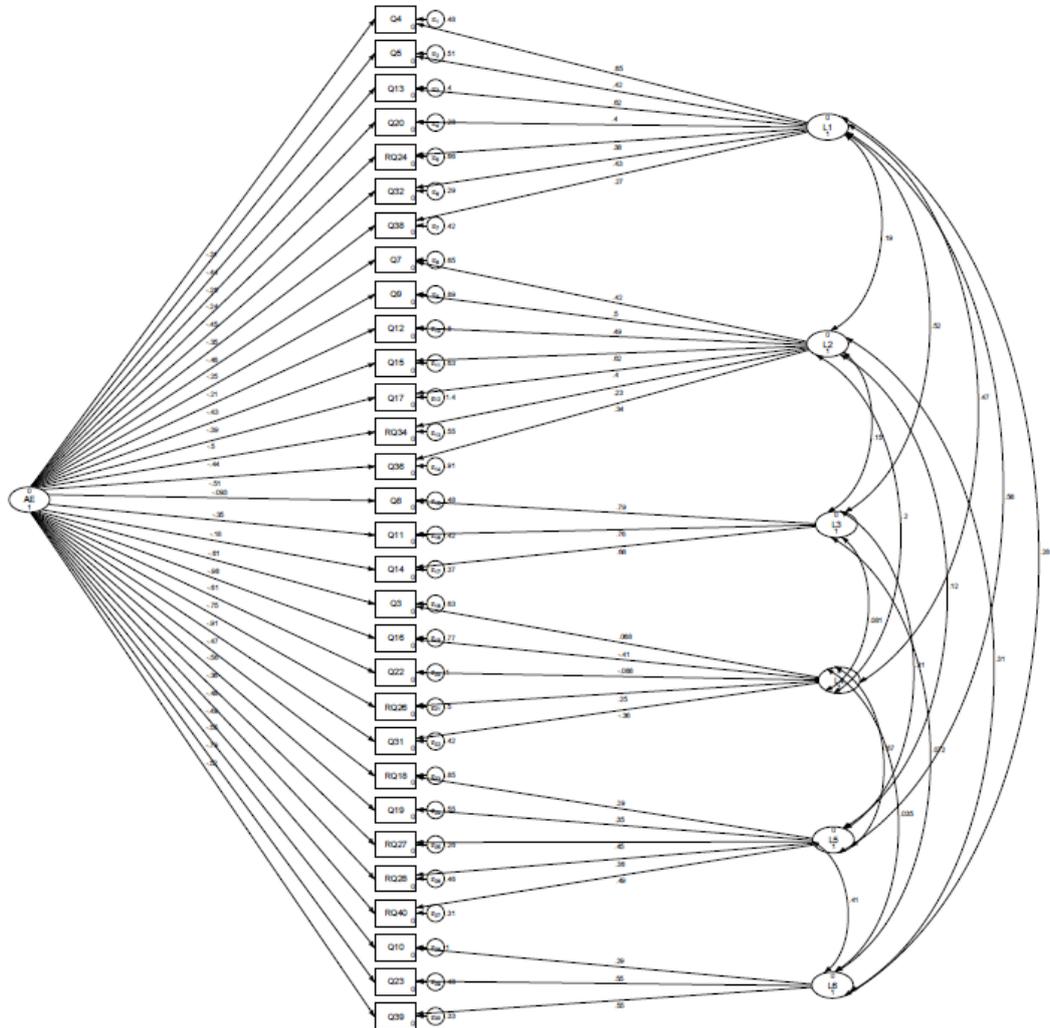


Figure 4. Model 7, containing all items of the AE scale and the ECS items plus the 5 positive emotions added items. This model consists of a general factor explaining the data, plus 6 specific factors. L1 represents happiness, L2 represents anger/fear, L3 represents love, L4 represents sadness, and L5 and L6 are two unknown factors. The specific factors correlate with each other.

**Reliability**

A possible scale with the AE component of the BES and the ECS also containing the positive loaded items added to the BES questionnaire proved to have a high reliability according to Cronbach’s alpha (.916). Further, it also displayed a good mean inter-item correlation supporting that the scale would have adequate internal consistency with a .270 mean (considered acceptable values if between .15-.50

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following Clark and Watson, 1995). It is noteworthy though that a scale with many items would tend to have a high alpha value (Clark and Watson, 1995).

*Descriptive Statistics*

Means, standard deviations, and inter-item correlations, as well as summary item statistics for the items representing the AE component of the BES and the ECS items, including the five items representing positive emotions added to the questionnaire, are shown in table 4 below.



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## Discussion

As organizations are gradually moving from being individual driven to becoming more of a synergetic teamwork intensive system, emotions within the workplace are gaining importance (Vijayalakshmi & Bhattacharyya, 2012). Throughout this article we have emphasized the importance of research on emotions and the understanding of the contagious nature of emotions for facilitation of a healthy workplace. In order to promote further development of the field we have attempted to shine light on issues regarding existing theory and measurements of empathy (represented by the BES) and emotional contagion (represented by the ECS).

### *Hypothesis 1*

The primary aim of this study was to examine whether susceptibility to emotional contagion measured by the ECS and the affective component of the BES are in fact measuring distinct constructs. Results suggest that these two scales are considerably overlapping in their measurements. The analysis shows that the highest correlation between the two factors was .94. Proposing, that researchers are today using measurement scales that may not measure what they portray to measure. Further, another important finding to point out is the inter-item correlation between some items of the affective empathy component of the BES and some of the ECS items which are at times higher than the inter-item correlation between items within their own scales. The EFA of all the items combined from both scales also showed that some items from one scale loaded on factors with items from the other scale, suggesting that they are measuring the same construct. This gets more evident when adding positive items to the AE scale.

As we have discussed, there is much disagreement among researchers related to the processes behind and the mechanisms at play through mimicry, emotional contagion, affective empathy and cognitive empathy and this confusion may be reflected and reasoned in our results. As researchers have not yet been able to consistently clarify the processes of affective empathy, cognitive empathy, and emotional contagion, a scale attempting to measure susceptibility to emotional

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contagion is also failing to measure what it is intended to. As a result, the only available measure for emotional contagion (measuring susceptibility) seems to be either measuring the same as affective empathy or having very little variance explained beyond affective empathy.

It is arguable that if emotional contagion and affective empathy are in fact the same concept, definitions and items should reflect the similarities and be clearly pointed to. However, there are findings in neuroimaging studies that question the conclusion of emotional contagion and affective empathy being the same construct. The Mirror Neuron System (MNS) has been found through neuroimaging studies to be an important mechanism for emotional contagion (Shamay-Tsoory et al., 2009; Lim & Okuno, 2014; Prochazkova & Kret, 2017). Moreover, Lim and Okuno (2015) argues that the MNS is a large component of empathy explaining that emotional contagion is a mechanism within affective empathy. However, Fan et al. (2011) did not find any consistency for activation of the MNS regions during empathy, showing that emotional contagion and empathy may be two different processes.

#### *Problems with Item Wording*

It is inevitable that the items of ECS and BES are somewhat lacking important distinctions within their item wording. Our results suggest high similarity between the affective empathy component of the BES and the ECS, which we argue can be reasoned through their lack of distinction in wording of items. Emotional contagion is continuously supported through research to be an automatic process, where affective empathy is often assumed to use more cognitive efforts when responding to other people's emotions. The scales are not reflecting this distinction. Moreover, there is no mentioning of intention or conscientiousness in the affective empathy items as there is no mentioning to lack of intentionality or absence of conscience for the ECS items. As most of the items are explaining a process of transference of emotions, the two scales end up measuring the same concept. Moreover, both of the scales are incorporating items similar to sympathy. However, sympathy is another construct recognized to be distinct from these two processes (however, unfortunately, often overlapped) (Baldner & McGinley, 2014).

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*Differentiations in Definitions not Mirrored in Scales*

Another differentiation often showed to between emotional contagion and affective empathy is the understanding of self and other. The main argument for this distinction is grounded in the need of differentiating empathy from often related constructs. With empathy the observer is often thought to be aware that their feeling is a result of perceived emotion in another (Cuff, Brown, Taylor, & Howat, 2014). Contrary, with emotional contagion the observer lacks the awareness and often believes the emotions observed actually belong to oneself. Baldner and McGinley (2014) found that neither of the empathy questionnaires investigated in their study had any factors which was consistent with a self-other awareness component. Moreover, they argue that this is a necessary component of empathy measurement, however, a component that current empathy scales fail to incorporate. We further argue that this is also a component left out in the measurement of susceptibility to emotional contagion.

Following Vijayalakshmi & Bhattacharyya (2012) one could suggest that factors such as self-awareness, sensitivity to others, self-monitoring, and stress also play a role in emotional contagion and should be reflected in the scale. Failing to address important differences in such measurement scales may lead to separate constructs by definition to be measured as equivalent constructs. This may further make it difficult to reach a comprehension of where similar constructs may overlap. Considering that ECS and the affective component of the BES have similar item wording in the scales supposedly measuring different constructs, it is reasonable that our analysis show that they are measuring the same construct. How these two constructs are dependent on each other/distinct/related needs to be reflected in definitions and in measurement scales in order for research to advance. This finding brings attention to the importance of re-evaluating existing scales and the definitions used. In this way, researchers can focus on investigating the mechanisms behind and the processes leading to both emotional contagion and empathy, which can further facilitate the development of improved accuracy in measurement scales.

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*Hypothesis 2*

The second aim of this study was to examine whether adding items with positive emotions to the BES would change the relationship between the affective empathy component of the BES and the ECS. Differently than expected, adding positive items to the affective component of the BES did not increase the relationship between the constructs following the original model (Model 1). One possible explanation is due to the fact that the affective empathy component became significantly correlated with the happiness specific factor of the ECS scale. This relationship was found to be non-significant when investigated with the original scales on their own. Further, the relationship between affective empathy and happiness specific factor may have balanced out, failing to reflect a higher relationship between the general factor of ECS and the affective component. However, when an investigation of the ECS and the affective component of the BES as one scale was made, some of the positive added items loaded on the same factor as the items measuring happiness in the ECS. This suggest that adding positive items to the BES (it is noteworthy that these items were mere exchange from negative to positive emotions of the existing items in the BES), reflected in higher similarity between the two scales.

*Adding Positive Items to the Measurement of Affective Empathy*

As research per today is supporting the notion that empathy involves all kinds of emotions, and does not exclude positive emotions, it is feasible to question the absence of positively framed items in frequently used empathy scales such as the BES and IRI. How affective empathy is measured through the BES and IRI may be problematic as it does not seem to capture the whole construct of affective empathy. We suggest that when adding positive items, more of the construct of empathy can be captured and scales such as the ones mentioned above should attempt to add positive items to become a more complete tool of assessment.

According to Eisenberg (1986) individuals may not have the same empathic accuracy for different emotions. Morelli and Lieberman (2013) reported in their study that no specific brain regions were found to be more or less activated when exposed to any specific emotion (such as happiness, sadness, and anxiety) supporting that empathy may be on some sense equally activated by all types of

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emotions and that a scale measuring the construct should encompass equally positive and negative items. However, the authors suggest that it may in fact be a person's cognitive load that may disrupt activity in any of the core regions related to empathy within the brain and reduce empathic responding. Their findings allied with our results could suggest that individuals may use defense mechanisms to avoid adopting someone else's negative emotions or may due to cognitive load, not always be similarly attentive to some/all emotions. Moreover, we call attention to the importance of merging neuroimaging studies and studies using other methods (such as self-report) for further development within the field. Further, we call attention to the importance of incorporating items using positive emotions to the measure of affective empathy to capture the whole construct.

### ***Limitations***

We have identified numerous limitations that are noteworthy. First, our sample was a convenience sample and may therefore not be a good representation of the entire population. Moreover, it is important to emphasize that because this research is based on a convenience sample, the data will not allow definitive findings to be generated. However, the data may provide a springboard for further research and allow us to link this data with existing findings with the ECS and BES (Bryman & Bell, 2015). Similarly, participants responded to the questionnaires online and not in the presence of researchers, which may introduce bias. Second, all participants responded to the questionnaires in the same order, consequently, fatigue may have played in and had an effect on later measures. Third, the data held a complete reliance on self-report collected at a single time point, which may affect common methods bias influencing the results (Podsakoff, MacKenzie, & Podsakoff, 2012).

### ***Future Research***

Along with Rajah et al. (2011) we argue that studying and examining emotions within the organizational setting will help facilitate a better understanding of social interactions and relationship dynamics in the workplace. Embracing and learning how to deal with different emotions within oneself and others, but also when and how one self and others may be susceptible to emotional contagion

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processes can give beneficial outcomes for both the organization and the individual on its own.

In order to advance in the field, accurate measurement and distinctions of relevant constructs are of great importance. We call for the essentiality of having measurements reflecting the definitions used, as well as having definitions that reflect the mechanisms of the actual construct. For advancement in the field of emotions and empathy a common understanding of the concepts is needed so that scales used to measure these constructs actually measure what they say to measure. Moreover, we call for the importance of critically re-evaluating definitions and scales intended to use before applying them in research.

Further, neuroimaging research may be an important way to go for researchers to better understand the mechanisms underlying emotional contagion and empathy. So far, research has been inconsistent. For future research to advance in the field of emotional contagion and empathy, we suggest that further neuroimaging studies need to be done in order to better understand which regions of the brain are activated during mimicry, emotional contagion, affective empathy and cognitive empathy. This way, researchers may be able to develop scales that more closely mirror the mechanisms behind these concepts and incorporate items that better reflect the actual concept being measured, resulting in more accurate measurement. As per today, little comprehension is given to the timeline of these processes. That means, whether one happen before the other, if they are dependent on one another or whether they work simultaneously is currently unknown. Therefore, to advance, such investigations needs to be made as well as the results for these investigations needs to be mirrored in definitions of the concepts.

Measurements used for these concepts are faulty and item wording needs to be re-evaluated both to capture the whole of emotional contagion and the whole of cognitive and affective empathy. Future research should investigate further how cognitive empathy works in relation to contagious emotions. To do this, new measurement scales more closely capturing the constructs and a further consensus on definitions are essential.

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It is further important to investigate specific emotions in relation to cognitive and affective empathy in order to get a better understanding of the processes behind empathy and certain emotions. Research evidently find support for different emotions evoking empathy. Further, no definitions we have come across includes terminology of certain emotions only being evoked during empathic processes. It is therefore important to get a better understanding of whether affective and cognitive empathy is evoked by different emotions and how the processes behind affective and cognitive empathy works in relation to emotions such as sadness, fear, anger, happiness and love.

### ***Concluding remarks***

This study underline issues regarding dimensionality and psychometric properties of scales used to measure emotional contagion and affective and cognitive empathy. By reviewing important distinctions and overlapping results within research on empathy and emotional contagion we have shed light on important issues that needs to be resolved and addressed for the field to develop further. Moreover, our results suggest that scales such as the BES (considering the affective component) and the ECS are in fact measuring the same constructs. We propose that this finding emphasizes the messy dimensionality in research on empathy and emotional contagion. Per today, researchers are using scales in belief that they are measuring what the scales say to measure. However, we point to the scarcity of these scales and how they do not seem to measure different constructs as they portray they do. Further, we suggest that most of this similarity might come from a lack of a common understanding among researchers relating the processes and mechanisms behind these two constructs and from a possible item wording muddle.

Further, this study showed that adding positive items increase the similarities between the happiness items of the ECS scale and the affective empathy scale. In addition, based on the results and available research we suggest that scales such as the BES and the IRI fail to address the whole concept of empathy. By leaving out positively loaded items which research supports to be part of the affective empathy component, these scales fail to measure the whole construct.

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Consequently, we call for a great need in re-evaluating these measurements and re-establishing the items used. In addition, we stress the importance of focusing attention on clarifying mechanisms and processes underlying emotional contagion, affective empathy, and cognitive empathy to allow further development of the field and more accurate scales.

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## Appendix A:

### **Emotional Contagion Scale (Doherty, 1997)**

- 3 – If someone I'm talking with begins to cry, I get teary-eyed.
- 4 – Being with a happy person picks me up when I'm feeling down.
- 5 – When someone smiles warmly at me, I smile back and feel warm inside.
- 6 – I get filled with sorrow when people talk about the death of their loved ones.
- 7 – I clench my jaws and my shoulders get tight when I see the angry faces on the news.
- 8 – When I look into the eyes of the one I love, my mind is filled with thoughts of romance.
- 9 – It irritates me to be around angry people.
- 10 – Watching the fearful faces of victims on the news makes me try to imagine how they might be feeling.
- 11 – I melt when the one I love holds me close.
- 12 – I tense when overhearing an angry quarrel.
- 13 – Being around happy people fills my mind with happy thoughts.
- 14 – I sense my body responding when the one I love touches me.
- 15 – I notice myself getting tense when I'm around people who are stressed out.
- 16 – I cry at sad movies.
- 17 – Listening to the shrill screams of a terrified child in a dentist's waiting room makes me feel nervous.

### **Basic Empathy Scale (Jolliffe and Farrington, 2006)**

- 18– My friends' emotions don't affect me much. (AE)
- 19 – After being with a friend who is sad about something, I usually feel sad. (AE)
- 21 – I can understand my friend's happiness when she/he

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does well at something. (CE)

22 – I get frightened when I watch characters in a good scary movie. (AE)

23 – I get caught up in other people’s feelings easily. (AE)

25 – I find it hard to know when my friends are frightened. (CE)

26 – I don’t become sad when I see other people crying. (AE)

28 – Other people’s feeling don’t bother me at all. (AE)

29 – When someone is feeling ‘down’ I can usually understand how they feel. (CE)

30 – I can usually work out when my friends are scared. (CE)

31 – I often become sad when watching sad things on TV or in films. (AE)

33 – I can often understand how people are feeling even before they tell me. (CE)

34 – Seeing a person who has been angered has no effect on my feelings. (AE)

35 – I can usually work out when people are cheerful. (CE)

36 – I tend to feel scared when I am with friends who are afraid. (AE)

37 – I can usually realize quickly when a friend is angry. (CE)

39 – I often get swept up in my friends’ feelings. (AE)

40 – My friend’s unhappiness doesn’t make me feel anything. (AE)

41 – I am not usually aware of my friends’ feelings. (CE)

42 – I have trouble figuring out when my friends are happy. (CE)

**Added Items:**

20 – I tend to feel enthusiastic when I am with friends who are excited. (AE)

24 – I do not become cheerful when I see people who are cheerful. (AE)

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27 – My friends' happiness does not make me feel anything. (AE)

32 – After being with a friend who is happy about something I usually feel happy.  
(AE)

38 – I often become happy when watching nice things on TV or in films. (AE)

Obs: Items are numbered above as they were in the questionnaire.

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