



A review of heterogeneous interpretations of Emotional Reactivity

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‘Emotional reactivity’ (ER) is an important construct in the analysis of individual temperamental differences, and has accounted for significant variance in studies with respect to its definition. Between 1920 and 2015, the meaning of ER has varied from physiology of emotional reactions, to stress, depression, and as a sub-type of empathy. This paper highlights the confusion in the literature about the meaning of ER and raises questions about the current use of the term ER as a valid construct. It clarifies heterogeneity within ER through the creation of a framework to explain different subtypes of ER and suggests new labels designed to help researchers specify the constructs underpinning the term ER.

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Introduction

ER is a diversified response

The term ‘emotional reactivity’ (ER) has been used for a variety of concepts. It has been defined as ‘emotional empathy’, ‘change in mood’, ‘intense reaction to emotional stimuli’, ‘excessive response to minor stressors’, ‘fearfulness’, ‘the degree of emotional response to sensory or social stimuli and ‘a cycle of emotional sensitivity, recovery, and degree of impairment’ (Carels et. al., 1999; Melchers, Montag, Market, & Reuter,

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2015). ER has been used synonymously with terms such as ‘affective reactivity’, ‘emotional responsiveness’, ‘emotional empathy’, ‘affective empathy’, ‘affective resonance’ and ‘emotional sensitivity’ (e.g. Turpyn, Chaplin, Cook, & Martelli, 2015; Wheeler, Davidson, & Tomarken, 1993). ER has also been referred as ‘low emotional reactivity’, ‘emotional regulation’ and ‘emotional control’. Even though such terms might be used interchangeably on different occasions, they convey varied meanings. ER has also been used to refer to the approach or avoidance system (Joseph, Liu, Jiang, Lynam, & Kelly, 2009). For example, shyness is a kind of ER in which a person avoids certain situations (Eisenberg, Valiente, & Sulik, 2009; Jones, Choi, Conture, & Walden, 2014), whereas sensation seeking is pleasure-seeking tendency, a positive quality of ER in which one becomes excited and motivated to approach a certain situation (Joseph et al., 2009).

What is reactivity?

Reactivity is a social phenomenon in which an external or internal stimulus evokes physiological or behavioural (Parkinson, 1996) response of an organism (Gittelsohn, Shankar, West, Ram, & Gnywali, 1997). Observable and hidden emotional responses are termed emotional reactivity (ER). However, the interpretations of those emotional responses/reactions by the observer or the observed depends on how the situation is perceived (Parkinson, 1996). For example, headache is a physiological sensation in response to which one might scream or sigh. In an angry situation, a person might shout in response to a physiological sensation while in a stressful situation, a person might sigh in response to a physiological sensation.

In a study (Eman, Nicolson, & Blades, 2015) on socio-affective traits and antisocial behaviours (ASBs), the relationship between three subtypes of empathy (i.e. ER, cognitive empathy and social skills) and two subtypes of ASBs (i.e. physically aggressive and non-aggressive) in 18-25 years old UK university students was examined. It was found that the concept of ER had a contradictory dual meaning in terms of heightened negative emotions that aimed to harm others (Hot & Sequeira, 2015) and disturbed positive emotions that aimed to help others (Kokkinos, Antoniadou, & Markos, 2014).

According to Lawrence, Shaw, Baker, Baron-Cohen and David (2004), ER refers to being disturbed by others’ distress, while affective empathy refers to sharing of others’ distress or emotions. Very few studies (Kokkinos et al., 2014; Lawrence et al., 2004) have used the concept of ER as a subtype of empathy. ER as an empathy subtype usually appeared in the form of ‘affective empathy’, ‘emotional empathy’ or ‘emotional sensitivity’ (Carreras et al., 2014; Centifanti, Kimonis, Frick, & Aucoin, 2013). Such terms did not clarify the nature of ER as an affective subtype of empathy. ER had been used to refer to a subtype of empathy implying disturbance due to others’ distress, sharing of emotions or the release of negative emotional energy, emotional over-reactivity or impulsive emotional reactions (e.g. Hot & Sequeira, 2015; Joseph et al., 2009) such as anger (Centifanti et al., 2013) and an exaggerated emotional response, often expressed in the form of verbal or physical aggression (e.g. Baker, Clanton, Rogers, & De Brito, 2015).

The necessity to label ER

The label ER or the meaning of ER has been used to refer to emotional experiences, expressions, generation, regulation and control (Bennett, 2013). The labels and the meaning of ER in the current literature do not specify whether ER is an experience, expression, or an intensity of emotion. ER is not only subjective and context dependent (Parkinson, 1996), but it also assumes different meanings and therefore there are many subtypes of ER. Thus, the research (e.g. Goldin et al., 2014; Joseph et al., 2009; Lawrence et al., 2004) addressing personality disorders, mental health problems, and psychological interventions dealing with problems in ER, lacks coherence. The discourse used to measure and address complex concepts such as ER must first clarify the definition of such concepts (Shotter, 2014).

Methodology

400 studies were searched through Google scholar, Web of science, Science direct, Sage publications and databases for doctoral dissertations to look up for the concept of 'ER'. Terms such as 'ER', 'affective empathy', 'affective resonance', and 'emotional sensitivity' referred to the concept of ER. The definitions of 'ER', 'affective empathy', 'affective resonance', 'emotional sensitivity' and the measures used to assess ER were examined. The context and the meaning, which referred to ER was also analysed. Only those articles, which included the term ER or implied ER or a term that was used synonymously with the term ER were included in this article. Initially, 128 articles met the criteria. Finally, 99 articles were included in this study, which closely related to the concept of 'ER'.

Results

Table 1 shows the overlapping terms and meanings of emotional reactivity. Such overlapping meaning of ER raised a very pertinent need to delineate the various terms and their different meanings. Building upon previous works (e.g. Lawrence et al., 2004; Shotter, 2014; van der Löwe & Parkinson, 2014), the current study offers a theoretical framework for the existing phrase 'emotional reactivity' through new specific terms.

Suggested theoretical framework

In order to clarify the nature of ER, the authors have broadly divided ER into the quality and nature of ER (see Figure 1). The quality of ER could include emotional numbness, emotional hyper-reactivity, emotional hypo-reactivity, and negative, positive, mixed, and temperamental ER in response to an internal or external stimulus. The nature of ER could include functionality of ER, the method used to assess ER, the way ER occurs (i.e. expressed/experienced), and the context in which ER occurs. The functionality aspect could be divided into action and verbal/non-verbal instruction subtypes.

Table I Different concepts related to ER in the literature

Concept/term	Meaning	References
Emotional reactivity origin	Emotion generation/ emotion regulation	McRae et al., 2012; Otto et al., 2014
Emotional reactivity (negative emotional reaction)	Negative emotions	Chapman et al., 2015; Leifker et al., 2015; Lusk et al., 2015; Schoenleber et al., 2015
Emotional reactivity/emotional responsiveness/ affective reactivity (negative and positive reactions)	Positive and negative emotions	Wheeler et al., 1993; Livingstone & Isaacowitz, 2015; Sloan, 2004
Emotional reactivity (extremely positive/negative)	Emotional arousal/emotional hyperactivity	Matusz et al., 2015; Pfaltz et al., 2015
Emotional reactivity (extremely positive, negative and neutral)	High levels defined as mania and low levels defined as anhedonia, depression	Cellini et al., 2015; Pfaltz, et al., 2015; Spina et al., 2015; Sturm et al., 2015
Emotional reactivity/Affective empathy / Emotional empathy/Affective resonance (positive or extremely empathetic)	Sharing emotions/feeling others' emotions	Aaltola, 2013; Ang & Goh, 2010; Bons et al., 2013; Carreras et al., 2014; Cheng et al., 2012; Light et al., 2015; Vachon, & Lynam, 2015
Emotional reactivity (emotional sensitivity/emotional empathy: i.e. positive)	Emotional sensitivity, feeling others' distress/joy	Centifanti et al., 2013; Davis et al., 2014; Joseph et al., 2009; Lawrence et al., 2004
Emotional reactivity (temperamental)	Tendency to express or experience fear, anxiety/agitation	Fredericks et al., 2015; McLennan, Paton, & Beatson, 2015
Emotional reactivity (temperamental)	Sensitive to negative or positive events (experiential, physiological, behavioural)	Infurna et al., 2015; Lowe & Fisher Jr, 1983; Matusz et al., 2015; Samson, Hardan, Lee, Phillips, & Gross, 2015; Shaw et al., 2015; Thummala, 2015

Emotional reactivity (temperamental)	The tendency to react intensely to emetogenic stimuli	Rzeszutek et al., 2015
Emotional reactivity (temperamental)	Relatively stable and individual-specific magnitude of responses to stimuli	Pisula et al., 2015
Emotional empathy/ affective dissonance	Feelings opposed to feelings of others	Vachon, & Lynam, 2015
Mixed emotions / Emotional reactivity	Experiencing two emotions of opposite valence, i.e. happy-sad	Berrios et al., 2015
Emotional reactivity/Emotional sensitivity/rejection sensitivity (caring attitude: i.e. Functionality)	Emotional sensitivity regarding oneself	Rudolph & Zimmer-Gembeck, 2014; Zimmer-Gembeck & Duffy, 2014
Emotional reactivity (Method based)	Physiological and self-conscious response to a stimulus	Grillon et al., 2015; Petersen & Cahill, 2015; Spina et al., 2015
Emotional reactivity (Method-based expression/experience)	Lack of experienced emotions, but emotions might be expressed (a type of emotional regulation-CU traits)	Golmaryami et al., 2015
Emotional reactivity (stress induced/ contextual/temperamental)	Intolerance of ambiguity	Lauriola, Foschi, Mosca, & Weller, 2015

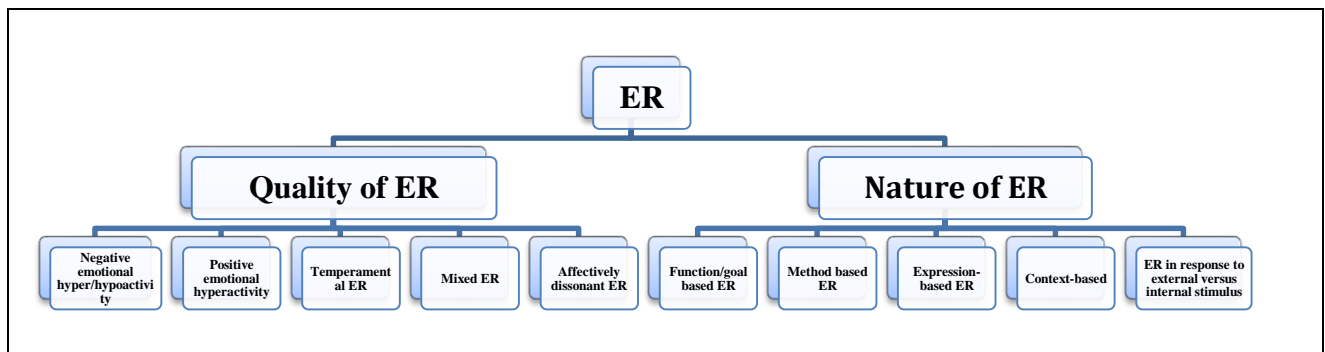


Figure 1. Suggested Theoretical Framework of Emotional Reactivity Subtypes

Negative Emotional hyper/hypoactivity

Negative ER might be defined in terms of expressed negative emotions or lack of positive emotions, which could harm self and others. It is suggested that negative ER subtypes could include emotions such as distressed, anxious, aggressive, painful, ashamed, fearful, agitated, frustrated, guilty, bitter, jealous, envious, emetogenic, and disgusted emotional reactions (Chapman, Dixon-Gordon, Butler, & Walters, 2015; Leifker, White, Blandon, & Marshall, 2015). The term ‘emotional hyperactivity’ might be effectively used to represent the concept of excessive emotional arousal (Pfaltz et al., 2015; Sebastian, et al., 2014) whereas a low level might be labelled as emotional hypo-activity (e.g. Castle, 2014). Negative emotional reaction consisting of anger or retaliation might be labelled as *angry emotional hyper-activity* in papers such as Lusk et al. (2015) and Schoenleber, Sippel, Jakupcak and Tull (2015).

Emotional hypo-activity implying negative effects on self or others might be categorised as a subtype of negative/harmful ER. It might also be classified as *empathetic emotional hypo-activity* (lack of empathy), *happy emotional hypo-activity* (lack of happiness), and *motivated emotional hypo-activity* (lack of motivation). These labels could initiate a new line of research on emotional hypo-activity amongst people with personality disorders such as psychopathy and callous and unemotional (CU) traits.

Absent/extremely low levels of ER (hypoactivity) might be labelled as Emotional Numbness (Frick, Ray, Thornton, & Kahn, 2013). The unemotional component of CU traits (e.g. Pardini & Byrd, 2012; Viding & McCrory, 2012) implies lack of affect/emotional numbness whereas callousness implies cruelty/aggression (e.g. Harkin, 2014; Viding & McCrory, 2012). Since callousness implies disregard for others and fearlessness, callousness might be labelled as callous ER, which would incorporate subtypes such as *fear hypo-activity*, and *empathetic distress hypo-activity*. The subtypes of emotional hyper-activity, emotional hypo-activity and emotional numbness might be useful in understanding CU traits.

Negative ER might also be expressed in terms of avoidance (Cooper, Russell, Skinner, Frone, & Mudar, 1992) and thus be labelled as *avoidance-based emotional reactivity*, in which the situation is avoided.

Positive emotional hyperactivity

Positive ER might be defined in terms of expressed positive or empathetic emotions, which could be beneficial for self and others. Recently the term ER has been used as a subtype of empathy (e.g. Kokkinos et al., 2014; Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004), which is an overt response to another individual’s disturbed or happy emotional state respectively. ER can also refer to sharing of negative (e.g. distress, fear, pain) emotions (Cheng, Hung, & Decety, 2012; Light et al., 2015). Empathetic ER is different from affective empathy because it implies disturbed emotions for others, whereas affective empathy/affective resonance implies shared distress or happiness (e.g. Aaltola, 2013; Bons et al., 2013; Lawrence et al., 2004). Nevertheless, the term ‘affective empathy’ has been synonymously used with the term ‘emotional reactivity’ and ‘emotional sensitivity’ (e.g. Patranabis & Banerjee, 2012).

The term ER as a subtype of empathy has been used interchangeably with emotional responsivity or physiological emotional responsivity to refer to disturbance in response/reaction to others’ distressed emotions

(e.g. Herpers, Scheepers, Bons, Buitelaar, & Rommelse, 2014). Positive emotions such as happiness, pride, and amusement have also been labelled as ER or ‘emotional responsivity’ (Livingstone & Isaacowitz, 2015; Sloan, 2004; Wheeler et al., 1993), which adds further confusion about the term ER and makes the term more ambiguous. There can be several subtypes of positive emotional hyper-activity such as excited, delighted, motivated, hilarious, proud, amused, empathetic and confident emotional reactions (Wheeler et al., 1993; Livingstone & Isaacowitz, 2015; Sloan, 2004). Similarly, positive coping strategies involve positive ER. The term *Approach-based ER* (Shirom, Westman, Shamai, and Carel, 1997; Wei, Vogel, Ku, and Zakalik, 2005), which mentions the concept of emotional reactivity in coping might be used.

In order to delineate positive subtypes of ER such as empathy, confidence and positive coping, various labels such as *Empathetic distress-oriented approach-based emotional reactivity* (positive emotional hyper-activity with an approach attitude to fix a certain problem), *resonant empathetic emotional hyper-activity* (shared distressed or joyous emotions; e.g. Lawrence et al., 2004; Vachon & Lynam, 2015), and *Empathetic delight-oriented emotional reactivity* might be used.

Since, ER (negative) as an angry impulsive reaction or emotional arousal has been positively related to aggressive behaviours (e.g. Baker et al., 2015), and sensation seeking traits (e.g. Joseph et al., 2009) whereas ER as emotional empathy (positive) has been inversely related to aggressive behaviours (Sebastian et al., 2012), it would be better to differentiate these concepts with different names.

Temperamental ER

The individual-specific response style might refer to emotional responses that could vary across individuals on the basis of temperament (Hum, 2012; Rzeszutek, Oniszczenko, Schier, Biernat-Kałuża, & Gasik, 2015). The temperamental response could be emotionally numb or amplified emotional response in the form of emotional hyper-activity. It is suggested that temperamental ER might be categorised as an individual-specific distinct emotional response style in studies which mention normal emotional response or stable emotions (Lucas & Baird, 2004; Pisula, Kawa, Danielewicz, & Pisula, 2015). For example, speaking aloud might indicate an extrovert personality rather than an emotionally hyperactive person. In case of low emotional arousal, a person with an introvert personality might not be responsive in a social gathering, but that does not imply low emotional arousal/ emotional hypo-activity (Arnrup, Broberg, Berggren, & Bodin, 2007).

Mixed types of ER and affectively dissonant ER

The negative and positive subtypes of emotional hyper-activity and emotional hypo-activity might also co-exist in a unique combination (Berrios, Totterdell, & Kellett, 2015). For example, *depressed-angry ER* includes depression in the form of emotional hypo-activity whereas anger is a form of emotional hyper-activity. Combinations of emotional hypo-activity, emotional hyper-activity and emotional numbness might be particularly apparent in CU traits. For example, *empathetic emotional hypo-activity* (i.e. lack of empathetic ER), *affective emotional hypo-activity* (i.e. lack of shared ER), *rejection sensitivity hypo-activity* (i.e. disregard for others, no concern about self-image), *impulsive/angry emotional hyper-activity* (i.e. antisociality), and

emotional numbness (i.e. unemotional), are all involved in callous and unemotional (CU) traits (e.g. Bartol & Miller, 2014; Frick et al., 2013).

Affective dissonance refers to unshared opposite emotions. For example, experiencing disgust at others' joy and experiencing joy at others' distress could be labelled as *jealous/envious/bitter ER*, and *sadistic emotional hyper-activity* respectively (e.g. Vachon & Lynam, 2015). These concepts might be explored simultaneously amongst offenders and the community samples.

Functionality/goals of ER

The variation in ER should be functionally defined with reference to the underlying social purpose of that emotion. ER might be sub-divided into harmful, beneficial, egoistic and altruistic subtypes according to the goals of ER. The ER intended to benefit others might be labelled as *beneficial/good ER* (Moldovan, 2011; Perr, 1975). *Beneficial/good ER* which might outwardly appear as an aggressive form of ER could be labelled as *beneficial/good aggressive ER*. ER intended to harm others could be labelled as *harmful/bad ER* (Moldovan, 2011), whereas *harmful/bad ER* which might appear as empathetic ER could be labelled as *harmful/bad empathetic ER*.

ER might also be sub-classified as *altruistic ER* (purely for another's welfare) versus *egoistic ER* (involving one's reputation). For example, if a person expresses an empathetic emotion for those in distress, the purpose of the expressed empathetic emotion might be to obtain the attention of others and to serve one's own ego (Lawrence et al., 2004). Politicians for instance, might help the victims of disasters to improve their reputation in the media and enhance their ego, but their joy/ego fulfilment might not be driven by an altruistic motive. Thus emotional reactivity might be serving either both egoistic and altruistic motives or egoistic motive alone.

Emotional sensitivity (i.e. egoistic ER) is the ER in response to *one's unshared own joy or distress*, which involves being *sensitive to one's ego* and is different from ER as a subtype of empathy involving *response to others' distress/or joy (altruistic ER)*. Emotional sensitivity involves the fear of being negatively evaluated, or the fear of being rejected, also known as rejection sensitivity (Rudolph & Zimmer-Gembeck, 2014; Zimmer-Gembeck & Duffy, 2014). However, emotional sensitivity/egoistic ER has also been defined in terms of empathy for others (Patranabis & Banerjee, 2012). Confusing egoistic ER with empathetic ER under the umbrella term of *emotional sensitivity* could result in a major interpretation error.

Method-based definition of ER

The methodology employed can alter the interpretations of ER and the conclusions drawn (Nelson, Shankman, Olino, & Klein, 2011). For example, ER might be measured in terms of reaction time and a faster response might be interpreted as an indicator of the level of ER (e.g. Linick, 2012). Thus reaction time then becomes the expression instead of the experience of ER.

A self-report survey such as the Empathy Quotient (e.g. Lawrence et al., 2004) measuring ER as a subtype of empathy appears to measure the perception of negative or positive emotions of a person towards a

particular stimulus according to the person's memory, insight, level and type of knowledge, mood, mental, or physical state at the time of self-report. Thus a self-report survey would be *perceived ER*, and ER measured through reaction time method would be *expressed ER* in contrast to supposedly *experienced ER*.

Neurophysiological studies might lead one to consider ER as emotional activation, which could then overlap with stress and pain signals (Corbett et al., 2014). Different paradigms have been used to measure ER, which have yielded different results (Viding, et al., 2014). Researchers (e.g. Joseph et al., 2009; Sebastian et al., 2012) have used the term ER regardless of whether it refers to emotional arousal, emotional empathy, reported ER or facial emotional expressions. Various researchers (e.g. Jolliffe & Farrington, 2004) have used different measures for measuring affective empathy and ER under the general term ER. Therefore, we must emphasize the future use of self-identifying terms for specific types of ER measured by a particular method.

Measures used in different studies

A number of researchers have used experimental methods to measure empathy and expression of emotions (Cellini et al., 2015; Chapman et al., 2015; Grillon, Quispe-Escudero, Mathur, & Ernst, 2015; Matusz, Traczyk, Sobkow, & Strelau, 2015; Shirtcliff et al., 2009; Spina et al., 2015; Sturm et al., 2015). Neurophysiological measures primarily indicate activation of the amygdala, skin conductance level, blood pressure levels or the heart rate (Goldin et al., 2014; Harvey, Zaki, Lee, Ochsner, & Green, 2013; Herpers et al., 2014). It is hard to infer whether expressed/experienced emotional ER is the result of physiological or psychological reasons (such as examination anxiety or faking). Thus, neurological methods should label ER as physiologically based ER to make the method consistent with the label, and avoid misleading readers to assume that expressed or experienced ER was also measured.

Self-report scales (e.g. Cross & Sharpley, 1982; Lauterbach & Hosser, 2007; Lawrence et al., 2004; Shaw, Timpano, Steketee, Tolin, & Frost, 2015) and qualitative research methods (e.g. Cosme, & Wiens, 2015; Infurna, Rivers, Reich, & Zautra, 2015; Lusk, et al., 2015) have also been used to measure empathy/ER. The empathic concern component of Interpersonal Reactivity Index (Davis, 1996) reflects ER, but it overlaps with affective empathy and sympathy. For example, the item, "*I often have tender, concerned feelings for people less fortunate than me*" might be interpreted as shared feelings of sorrow, pity, helplessness (shared emotional experience) or unshared feelings of sympathy (just feeling sorry for others), or an emotional response to an external/internal event (being moved by an event). Such items might be indicating a range of emotions such as pity, sympathy, emotional sensitivity to enhance self-image instead of ER as a subtype of empathy involving disturbed emotions at others' distress. Therefore, the validity of such self-report items claiming to measure empathetic ER is questionable.

Expression-based definition of ER

The expression of ER could be an action or a verbal/non-verbal instruction. For example, in a study on rats, ER was expressed through an action, i.e. number of defecations (Grootendorst, De Kloet, Vossen, Dalm, & Oitzl, 2001). ER has also been verbally/non-verbally expressed (Giesbrecht, Miller, & Müller, 2010; Turpyn et al., 2015). In order to identify the expression of ER, one might use the terms *Action* and *Verbal/Non-verbal*

instruction (e.g. de Sampaio, Soneira, Aulicino, Harris, & Allegri, 2015). *Action ER* refers to serving one's own or others goals through a practical response while *Verbal/Non-verbal instruction ER* refers to serving one's own or others goals through verbal or non-verbal directions instead of a practical response. For example, *Other-oriented action ER* might be used to help the child in sitting back up from a fall while *Other-oriented Verbal/Non-verbal instruction ER* might refer to instructing the child to sit up himself/herself. Drinking a glass of water to reduce one's anger would be a *Self-oriented action ER*, whereas murmuring to oneself to remain calm in stress would be *Self-oriented verbal ER*.

ER in response to external versus internal stimulus

When a person is affected by an external stimulus, ER is defined in terms of bottom up emotion generation/regulation/control, whereas when there is an internal stimulus, emotional reactivity is defined in terms of top-bottom emotion generation/regulation/control (e.g. McRae, Misra, Prasad, Pereira, & Gross, 2012; Otto, Misra, Prasad, & McRae, 2014).

Context-based definition of ER

ER might be different in the presence of a neutral stimulus, no stimulus, or in the absence of a comparison condition (Sloan, 2004). It might be desensitized after exposure to violence (Krahé et al., 2011). In spousal relationships (Lawson & Brossart, 2001; Willi, 1984), after several years of marriage, meeting one's partner at the end of the working day may not elicit emotional reactivity. Meeting the same partner after several weeks away might rekindle emotional reactivity. Even in the absence of a partner (no stimulus) one might be excited to imagine one's future partner.

Implications

Research (e.g. Sebastian et al., 2012) has led towards contradictory results not only due to varying definitions of ER but also due to the lack of knowledge of factors surrounding the complex term ER. For example, CU traits and aggression have opposing relationships with ER at the neural level whereby both CU traits and aggression have suppressor effect on each other, thus indicating that ER is not significantly related to both CU traits and aggression (Sebastian et al., 2012). Therefore, the current review has implications for such studies (Bennett, 2013; Bennett & Kerig, 2014; Sebastian et al., 2012). The subtype of ER as well as the nature of aggression and CU traits need to be identified before reaching any conclusion about the relationship between ER and CU traits or ER and aggression.

The current review may also help for new labels to be devised based on the mechanism identified in this research, which could facilitate future research in the area. For example, research might explore subtypes of beneficial ER amongst teachers and managers. Students learn best from some teachers but not others possibly due to their certain subtype of temperamental ER (e.g. Cheung, 2004; Zhang, & Sapp, 2009).

Even though the terms "positive ER" and "negative ER" have been used to indicate the subtypes of ER, the use of such terms is limited to a particular research paper (Bylsma, Morris, & Rottenberg, 2008) which

has created the terminology which fits its own research criteria. Vachon, Lynam, & Johnson (2014) suggested that the concept of empathy should be broadened to other emotions which might be accompanying empathy.

It is argued that instead of broadening the concept, there is a need to specify certain ER subtypes to validate the exact subtype of ER. Research has to critically consider factors such as the actual meaning of self-reported negative ER in self-report questionnaires (Davis et al., 2014; Lawrence et al., 2004) and whether it really implies experienced ER. If biological or neurological measures are used (Parvaz, Moeller, Goldstein, & Proudfit, 2014), it has to be labelled as neurologically-based ER. We also have to consider if ER could be actually induced in the lab conditions (Goldin et al., 2014), and to determine the subtype of negative ER, namely whether it is anger-based ER, anxiety-based ER, or jealousy-based ER, as experienced in conduct problems (Lockwood et al., 2013).

Conclusion

The terminologies suggested in our review are needed in order to acquire correct interpretations, refine research, and finally develop interventions that target specific emotional problems. If these terms are not clarified in the literature (Centifanti et al., 2013; Jolliffe & Farrington, 2004), the advances in the field of ER might become fruitless due to lack of clear theoretical grounding. Although the role of the contextual factors in interpreting emotions have been mentioned in the literature (Parkinson, 1996; van der Löwe & Parkinson, 2014), no review appears to address the confusion surrounding the concept and term labelled as ER. The current review provides an effective structure to reach more valid and reliable conclusions about the exact subtype of ER in a specific context. It also highlights that ER labels should be precise according to a particular subtype of ER and consistent with the meaning of ER in future research exploring concepts that have not been yet investigated and to meaningfully interpret heterogeneous forms of ER in the existing literature.

This review will help researchers in choosing the most appropriate method for assessing a specific subtype of ER and designing specific interventions to cure subtypes of negative ER or to channel negative ER into positive ER. Such interventions will have direct implications for educationists, teachers, health experts, criminologists, managers, leaders, and adolescents.

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