



Differences in male and female subjective experience and physiological reactions to emotional stimuli



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ABSTRACT

Research based on self-reported data often indicates that women are the more emotional sex. The present study examined differences in emotion between the sexes across two components of the emotional process: subjective experience and physiological reactions to emotional stimuli. During the experimental study, participants ($N = 124$; 22.5 ± 2.88 ; 51 males) subjectively rated their emotional experience (valence and intensity) towards presented positive and negative affective stimuli, while physiological reactions (facial electromyography, heart rate, skin conductance, and finger skin temperature) were measured during expositions.

Results from self-reports suggest that women declared more intensive emotional experiences for positive and negative stimuli and rated negative stimuli as more negative in comparison to men. Physiological measurements showed differences between the sexes in the physiological baseline measurements (facial electromyography, skin conductance and finger skin temperature). However, physiological responses towards positive or negative emotional stimuli did not prove to be different between men and women, except for finger skin temperature. Relations between self-reported subjective experiences and physiological changes were weak and insignificant.

Collectively, our findings suggest certain emotional differences experienced between men and women. These differences can be found specifically in self-reported subjective experiences, while significant differences were not predominantly present in recorded physiological reactions.

1. Introduction

Research studies into emotional differences between the sexes have been presented in psychology for decades. However, an emotion is a multicomponent process and clear evidence of experiential differences between men and women in this area remains elusive. Many questions arise when an emotion is theoretically divided into its specific components. For example, do men and women experience, interpret, read, label or rate emotions differently? Is the physiological reaction of men and women different in intensity, response profile, habituation or process? Are there predominant differences in action tendencies, behavior, and facial expression between the sexes? And do men and women regulate emotions differently?

According to the empirical evidence related to sex differences in various domains of emotional processing, women have steadily rated themselves as better at emotional expression (Simon and Nath, 2004). Specifically, they have self-reported feeling various emotions more often (Brebner, 2003), more intensely (Gross and John, 1998 and

Grossman and Wood, 1993) and have expressed their emotions more than men during social interactions (Barrett et al., 1998) or towards emotional stimuli (Kring and Gordon, 1998). Women also consistently showed greater proficiency in coding and decoding both verbal and nonverbal emotional expression (Brody and Hall, 2000; Hall, 1998; Hall and Matsumoto, 2004). They are also expected to smile more, share their feelings more, and express emotions more often and with greater intensity than men (Brody and Hall, 2000; Guerrero and Reiter, 1998). In contrast to this, men are expected to inhibit their emotions more, except for so called “powerful emotions” - e.g. anger or pride (Brebner, 2003 and Heesacker et al., 1999, and Timmers et al., 2003).

Generally, results from self-reported emotional experiences and evaluations of reactions in different studies and situations repeatedly showed that women express increased emotionality over men. Nevertheless, sex differences in self-reports are also viewed as artifactual measurements presenting merely an expression of social desirability (Feingold, 1994) as a socially-constructed phenomenon grounded in and stemming from a general gender emotional bias that

Abbreviations: EMG, Electromyography; EMG-CS, Facial Surface Electromyography on the corrugator supercilii; EMG-ZM, Facial Surface Electromyography on the zygomaticus major; SC, Skin Conductance; SfTemp, Finger Skin Temperature

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represents different levels of desirability and emotional functionality for men and women.

The research suggests that men and women construct beliefs about their emotions in line with the general social role ascribed to their sex (Barrett et al., 1998). The cumulative effect being the misrepresentation of emotions from the way they were actually experienced.

Evidence suggests that the greater the room for the construction of feeling and interpretation, the more self-reports are shaped by socially imposed beliefs regarding emotional norms. Barrett et al. (1998) or Robinson and Clore (2002), for example, showed that real-time self-reports of emotional experiences differ less between men and women than those that are retrospective. In some studies such differences disappeared almost entirely when the participants were anonymous or de-individualized (Lightdale and Prentice, 1994).

Evidence related to sex differences from the perspective of physiology is far less consistent. For example, in studies that examined facial electromyography (EMG), measuring facial muscle movement responses to evocative stimuli (pictures, film clips), some studies have reported sex differences (e.g. Bradley et al., 2001 and Grossman and Wood, 1993) and some have not (e.g. Kelly et al., 2006 and Sloan et al., 2002). Females expressed more muscle reactivity than males, especially for negative (Bradley et al., 2001) or intensive emotional stimuli (Sharp et al., 2006). However, in other studies, significant differences in facial electromyography in reaction to negative and highly intensive stimuli were not found (Read et al., 2016). Numerous investigations revealed sex differences in the autonomic nervous system (ANS). ANS activity is viewed as an index of arousal of the emotional process and significant differences were found repeatedly in the heart rate variability (HRV) (for an excellent meta-analysis see Koenig and Thayer, 2016), with women having greater HRV (e.g. Thayer et al., 2006), heart rate baselines or mean heart rates than men in many different tasks and studies (Pham and Rosen, 2002 and Zhang, 2007). However, studies have also reported that overall cardiovascular function was similar for men and women in their day-to-day activities and also that the profiles of physiological responses towards emotional stimuli were comparable between sexes (Neumann and Waldstein, 2001 and Kivikangas et al., 2014), or that men and women did not differ in HR.

Sex differences were found in studies focused on the electrodermal activity (EDA). In various experimental tasks and circumstances, skin conductance in women was found higher (e.g. for disgust), lower (e.g. for fear) or at the same level of arousal as in men (Brody, 1999; Kivikangas et al., 2014 and Kring and Gordon, 1998 and Lang et al., 1993). In normal adults aged 18 to 45, men at neutral environmental temperatures often have a higher baseline skin conductance level than women and the skin temperature - another indicator of physiological arousal - of females is typically lower compared to men (Chamberlain et al., 1995 and Marchand et al., 2001).

Brain studies focused on the extent to which discussed sex differences (behavioral, self-reported, expression) are reflected in corresponding differences in regional brain activation remains another unresolved point. One of the accelerators for the inconsistent scientific results is that there is not a gold standard of measuring emotion and affective experience in various components. Brain studies evidence suggested that males and females use different strategies and cues during emotional processing, which may lead to sex differences in the observed (or subjectively reported) emotional process (for an excellent review see Kret and De Gelder, 2012 and Whittle et al., 2011) and differential brain activity patterns between men and women (Stevens and Hamann, 2012). For example women exhibited greater activation than men in the left amygdala for negative emotions, while men exhibited greater activation than women in the left amygdala for positive emotions (see Stevens and Hamann, 2012); women showed a greater association between the momentary arousal ratings and neural responses in the anterior insula cortex (representation of bodily sensations), whereas men showed stronger correlations between their momentary arousal ratings and neural responses in the visual cortex

(Moriguchi et al., 2014). Despite different results from diverse brain regions from various studies with many stimuli types, brain studies with one voice cry out for the need to consider individual and sex differences in understanding (not only) the neurobiology of emotion.

Sex differences in men and woman are particularly pronounced for the social expression of emotion (self-reports, behavioral expression, facial and verbal expression), but it seems that this is often generalized and transferred across other parallel emotional components, including the physiological processing of an emotion, action tendency, or emotion regulation etc.

When the relations between synchronized components of an emotion are examined, empirical work has provided evidence of covariation between several physiological measures and the affective dimensions of valence and arousal (e.g. Bradley et al., 2001 and Lang et al., 1993). However, self-reported emotional experience does not always converge with physiological changes and the accuracy regarding changes in valence and the intensity of feelings is disputable.

This “inaccuracy phenomena” can be attributed, to some degree, to the vagueness of self-reported ratings that correspond to the “general” evaluation of a feeling. Moreover, the generalized information about our emotional state could be decoded from many different sources. Robinson and Clore (2002) mentioned at least four different types of sources: direct access via feelings (experiential knowledge), retrieved from the past (episodic memory), mediated by belief about the emotions likely to be elicited in a particular type of situation (situation-specific belief) or by trait emotion scales (e.g. empathy), as well as social stereotypes (e.g. gender stereotypes). Furthermore, a participant can create the generalization of a feeling as a result of the average, peak or end phase of emotional processing, where the beginning or the end is fuzzy and difficult to define.

With this in mind, it is important to stress that a discrete emotion is comprised of a number of measurable component parts such as subjective experience, physiological changes, cognitive appraisal, expressive behavior, regulation and action tendencies. Reflecting on a single component in a complex and synchronized process in order to make a comparison with a physiological reaction, for example, can be problematic. This component inaccuracy is connected to a serious concern that not many individuals are aware of and/or capable of reporting on their momentary emotional state (Mauss and Robinson, 2009). Because of this, emotional information is often overlooked in favor of rational cognitive information which people believe to be more reliable to work with. A lack of “useful” information could be another factor for facilitating the socially-constructed phenomenon (gender stereotypes) that makes information processing easier and allows a person to rely on previously stored and historically functional knowledge in place of new information.

Many studies suggest that the apparent occurrence of differences in emotions between men and women might be predominantly based on stereotypes and emotional beliefs rather than on genuine gender-specific variance (Hess et al., 2000 and Robinson and Clore, 2002). Research has produced evidence indicating that sex differences in emotions are strongly dependent on context and situation. Correlations have been recognized with prescriptive social norms, as well as established gender-specific of display rules and feeling rules and distinct types of emotional processing that fit cultural goals and values (Fischer et al., 2004 and Mesquita et al., 2016). Comparing self-reported experience and physiological responding should help in understanding the roles and relations between these two parallel components of emotion.

2. Goals

The study was designed to assess whether men and women differ in the experiential self-reported affect and physiological components of emotion in a controlled, laboratory setting. Participants were passively presented with the stimuli. The main goal of the study was to test the

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