Current Trends in Natural Sciences
Vol. 10, Issue 20, pp. 192-202, 2021
https://doi.org/10.47068/ctns.2021.v10i20.026
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

LAUGHTER AND EMPATHY

Nicoleta Răban-Motounu [1,*]

[1]University of Pitești, Department of Psychology, Communication Sciences, and Social Assistance
Târgu din Vale, No.1, Pitești, Argeș, Romania

Current Trends in Natural Sciences

Abstract
At a biological level, laughter was found to help in dealing with pain and suffering. From a psychological perspective, its effects have been studied both at intrapersonal and interpersonal levels. At an intrapersonal level, laughter contributes to self-regulating emotions (especially lowering the trait anxiety), diminishing the expression of anger, internally or externally, the same time with increasing self-acceptance. At interpersonal level, laughing together builds trust, while being laughed at may be traumatic. In the present study, the objective was to investigate the effects of laughter on empathy, awareness, and acceptance of personal experience. The participants in the study, all women, watched a situational comedy for 1.5 hours, with different life situations which may seem negative, but presented in an amusing manner, and, very important, with a happy end. At the end, they completed the empathy and awareness questionnaires. Statistical analysis, comparing their scores with those in a non-treatment condition, showed that laughing at the situational comedy significantly influenced almost all aspects of empathy, significantly decreasing the personal distress from empathizing with others, but also sensitivity and emotional interest towards them, without significant influence on awareness and acceptance of personal experience.

Keywords: awareness, emotional distress, emotional regulation, laughter, perspective taking.

1. INTRODUCTION

There have been some studies on the relationship between laughter and empathy, with its different subtypes or facets. Most of them refer to the effects of social laughter and to the ability to recognize the authenticity of laughter, by subtle and rapid interactions between the facets of empathy and cognitive mechanisms. An enhanced ability to detect authentic laughter is predicted by the empathic concern and the emotional contagion (Neves et al. 2018). Empathy may be considered as an intuitive, immediate, experiential, somatic process of understanding the needs or intentions of another in the perceptual field at the same time with the object that corresponds to that specific need, but also and analytical, deliberate process involving imagination and thinking at an abstract level (Corradini & Antonetti, 2013). The first one may involve the activation of the mirror neurons, while the other relies on theory of mind, built by the observation of empathic social interactions (Alcalá-López, Vegeley, Binkofski, & Bzdok, 2019).

People have somatic reactions to the emotions lived and transmitted by those around them with an ability to distinguish between authentic and acted emotional expressions of both sadness and joy, and between the negative or positive emotions as reflected in the pupil dilation, a reaction following the activation of the autonomic nervous system. More specific, authentic laughter and vocalizations

*Corresponding author, E-mail address: nicoleta.motounu@upit.ro

Current Trends in Natural Sciences
Vol. 10, Issue 20, pp. 192-202, 2021
https://doi.org/10.47068/ctns.2021.v10i20.026
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

are perceived as more contagious, arousing, and authentic than acted vocalizations and cry, in general (with different effects for crying, the acted crying being responded with lower activation than authentic crying), the last ones eliciting increased pupil dilation, as an effect of the activity of the sympathetic nervous system (Cosme et al., 2021). Considered to be part of the social skills, recognizing the real emotions and reacting accordingly with the activation of the sympathetic nervous system highlights the complexity of social interactions, those involving the expression of pain thorough crying and inauthentic positive manifestation triggering a "fight or flight" reaction, with a rapid sharing of information between individuals concerning the level of danger or safety. Only the cognitive empathy, the ability to take the perspective of another and to interpret another's reaction (and not social skills, emotional reactivity and empathic difficulty) correlated with the medium pupil dilation and only in the laughter condition per total (and not for the higher pupil dilation condition), suggesting the intervention of complex cognitive processing in the authentic laughter especially. Elevated oxytocin levels reduced activation in the amygdala and enhanced functional connectivity between the amygdala and regions involved in emotional regulation during infant laughter (Riem et al. 2012) suggesting that, in an interpersonal bond, infant laughter stimulates emotional regulation in mother and social learning. In persons with higher cognitive empathy, a self-enhancing humor style is positively associated with the grey-matter volume, but not in those with low cognitive empathy (Li et al. 2018). The duration of exclusive breastfeeding was negatively associated with the rapidity of recognizing happiness in the infant, so did the amounts of breastfed meals per day with the promptitude in recognition of anger (Krol et al., 2014). 8-months-old infants who tended to look longer at a happy peer proved to be more likely to respond with left lateralized frontal activity, while a crying peer elicited right lateralized frontal activity (Crespo-Llado et al., 2018).

Social laughter seems to trigger endogenous opioid release in thalamus, anterior insula, cingulate, and frontal cortices, caudate nucleus and putamen, expressed in amusement and calmness. Also, the pain threshold increases significantly (Manninen et al., 2017, Nummenmaa & Karjalainen, 2018). The same effects were observed for social acceptance and, in different brain regions, for social rejections or losses (Hsu et al., 2013).

Starting from these studies focused on the effects of laughter at interpersonal laughter, the objective of the present study was to investigate how laughter affects the self-assessed ability for empathy and empathic actions, with a focus on the intrapersonal, psychological effects. More specific, we wanted to come with a design that excludes the possible negative effects of a person being laughed at and being influenced by another's laughter, in order to explore the possible benefic effects of laughter at intrapersonal and interpersonal level by means of empathic relating and relief from the negative affects felt when empathizing with another person in a difficult situation. The main hypothesis was that laughter helps in alleviating personal distress and reducing the need for emotional regulation, and affects the ability to take the perspective of another, without the personal awareness being affected. The working hypothesis were:

- Solitary laughing at a situatinal commendy has a significant influence on the emotional interest in others.
- Solitary laughing at a situatinal commendy has a significant influence on the awareness of a perceived other.
- Solitary laughing at a situatinal commendy has a significant influence on the self-other awareness.

*Corresponding author, E-mail address: nicoleta.motounu@upit.ro

Current Trends in Natural Sciences
Vol. 10, Issue 20, pp. 192-202, 2021
https://doi.org/10.47068/ctns.2021.v10i20.026
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

- Solitary laughing at a situatinal commendy has a significant influence on perspective taking (cognitive empathy).
- Solitary laughing at a situatinal commendy has a significant influence on the empathetic attitudes.
- Solitary laughing at a situatinal commendy has a significant influence on the awareness of experience.
- Solitary laughing at a situatinal commendy has a significant influence on the acceptane of experience.
- Solitary laughing at a situatinal commendy has a significant influence on the emotional distress.
- Solitary laughing at a situatinal commendy has a significant influence on the sensitivity.

2. MATERIALS AND METHODS

In order to accomplish the objectives, we conducted an experimental study with two research groups, also integrating psychometric and statistical methods.

The participants in the experiment were 22 women, with ages between 22 and 45 years (M=37.90, SD=8,76), participating in a Health Psychology course on psychological resources in the experimental group, and another 22 women with similar characteristics, undergraduate Psychology students.

Materials and methods:

In order to assess empathy, we used *The Questionnaire of Empathy* and *The Empathy Assessment Index.* For awareness and acceptance, we used *The Philadelphia Mindfulness Scale.*

The Empathy Questionnaire (EQ) is an adaptation from the study conducted by Baldner and McGinley (2014) exploring the factors assessed by the most used measures of empathy as the correlations between scales were only moderate. So, they came with a six-factor solution to assess different subcomponents of empathy, retaining the items from the scales with the highest factor load. We translated those items into Romanian and conducted their adaptation, established a unitary answering form on a 5-points Lickert scale, resulting an instrument with good or very good internal consistency on each factor (from .75 to .89). *Emotional Interest* is the first factor, with 12 items assessing the person's interest in the emotional life of the others. *Perceived Other Awareness* (15 items) addresses the self-assessed ability to understand and to predict the emotional state of another. *Emotions with Fictitious Characters* (9 items) measures the ability of imaginary living of the experience of fictitious characters from movies, books or TV shows. *Personal Distress* (7 items) refers to the ability to cope with situations eliciting negative emotions. *Perspective Taking* (5 items) refers to the intention to take and understand the perspective of another by means of superior cognitive mechanisms (imagination and thinking). Finally, *Sensitivity* (6 items) is dedicated to the self-assessment of social abilities, of empathic relating with others.

The Empathy Assessment Index (EAI, Lietz et al. 2011) is a 17-item questionnaire derived from the 50-item EAI. The short form resulted to be the best fitting solution to the initial four-factor model of empathy at the basis of the initial form, with an attempt to add another dimension: the empathetic attitudes. The four initial dimensions are: the affective response (AR) with three items referring the tendency to live the emotions experienced by others (a sort of emotional contagion), emotion regulation (ER) the tendency to recover quickly from negative emotions and emotional stability, perspective taking (PT) referring to the ability of having a mental perspective including the personal perspective and that of another, eventually entirely different, and self-other awareness (SOA) referring to the ability to make a clear distinction between personal affective states and those lived

*Corresponding author, E-mail address: nicoleta.motounu@upit.ro

Current Trends in Natural Sciences
Vol. 10, Issue 20, pp. 192-202, 2021
https://doi.org/10.47068/ctns.2021.v10i20.026
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

from empathizing with another and to verbalize them. The empathetic attitudes scale (EA, three items) refers specially to understand the material difficulties of other people and to accept that the society should help them.

The Philadelphia Mindfulness Scale (PHLMS, Cardaciotto et al., 2008) is a 20-item questionnaire which assesses the awareness of personal moment-to-moment experience (sensorial, emotional or cognitive, 10 items), and the acceptance of what comes into the awareness field (10 items). The Romanian form of the questionnaire has a good internal consistency (.78) on both scales.

Procedure: The participants in the experimental group watched individually, online, a situational comedy ("A Pit Full of Money") with a couple going through some difficult and somehow amusing situations, but with a happy end. At the end, they completed the questionnaires online. The participants in the control group completed voluntarily the questionnaires as part of a regular activity.

3. RESULTS AND DISCUSSIONS

Watching and laughing at the situational comedy significantly decreased the participants' interest in the emotions of others (t=-3.749, p=.001, d=0.902), confirming the first hypothesis (Figure 1).

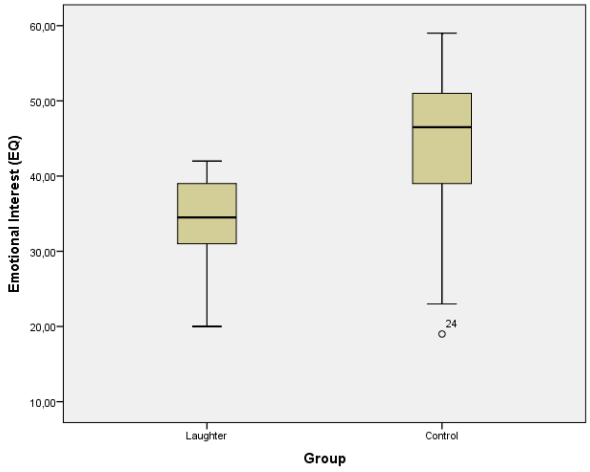

Figure 1: Emotional interest, as assessed with QE, in the experimental (Laughter) and the control groups

After watching and laughing at the comedy, the participants had a significantly lower awareness of a perceived other than those in the control group (t=-7.142, p=.000, d=2.188), confirming the second research hypothesis (Figure2).

The differences for the self-other awareness for the participants in the two research groups were not statistically significant (t=-2.019, p=.050, d=0,566): The collected data did not confirm the third hypothesis (Figure 3).

The participants in the laughter condition had significantly lower scores on Perspective taking (EQ), meaning the intention to grasp the perspective of the other, than those in the control condition (t=-5.268, p=.000, d=1.444), confirming the fourth hypothesis (Figure 4).

The scores on *Perspective Taking* on EAI were significantly higher for the participants in the laughter condition than for those in the control condition (t=8.434, p=.000, d=3.138) (Figure 5).

The scores for the *Empathetic Attitudes* (EAI) were significantly lower for the participants in the laughter condition than for those in the control group (t=-3.763, p=.001, d=1.032), confirming the fifth hypothesis (Figure 6).

*Corresponding author, E-mail address: nicoleta.motounu@upit.ro

Current Trends in Natural Sciences
Vol. 10, Issue 20, pp. 192-202, 2021
https://doi.org/10.47068/ctns.2021.v10i20.026
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

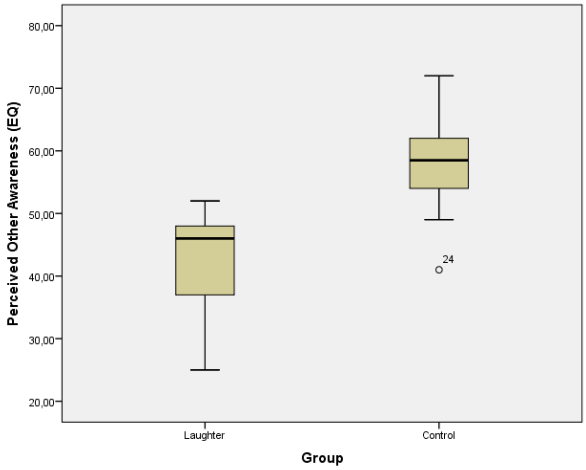

Figure 2: Perceived other awareness, assessed with QE, in the experimental (Laughter) and the control groups

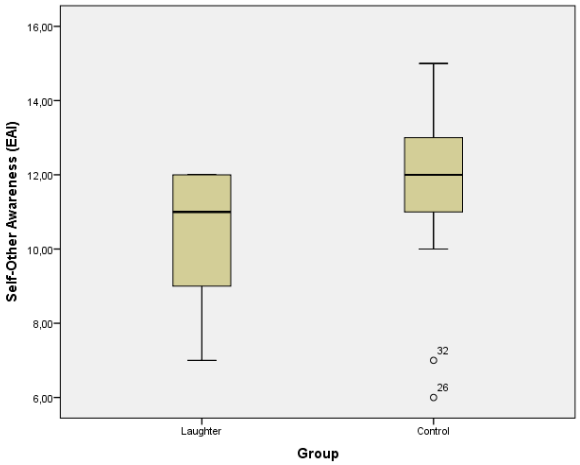

Figure 3: Self-Other Awareness, assessed with EAI, in the experimental (laughter) and the control groups

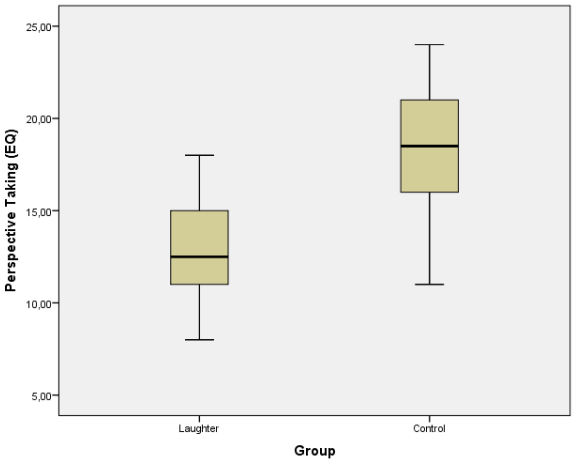

Figure 4: Perspective taking, assessed with QE, in the experimental (Laughter) and the control groups

*Corresponding author, E-mail address: nicoleta.motounu@upit.ro

Current Trends in Natural Sciences
Vol. 10, Issue 20, pp. 192-202, 2021
https://doi.org/10.47068/ctns.2021.v10i20.026
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

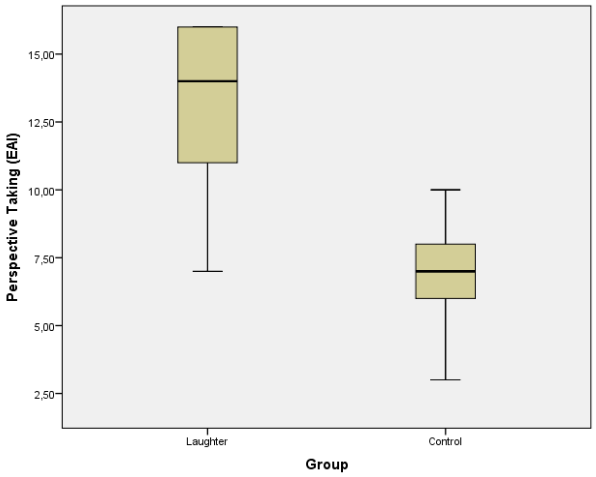

Figure 5: Perspective Taking, assessed with EAI, in the experimental (Laughter) and the control groups

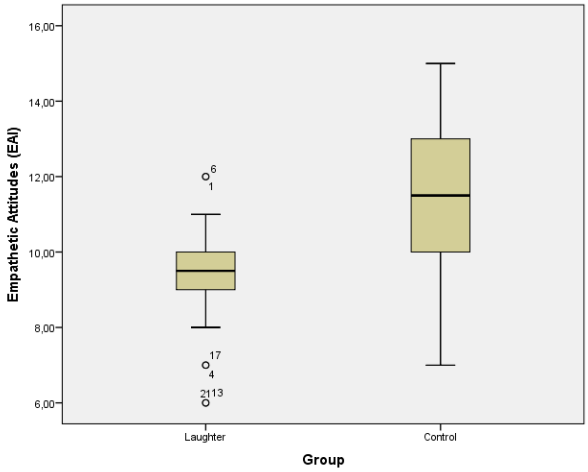

Figure 6: Empathetic attitudes, assessed with EAI, in the experimental (Laughter) and the control groups

The difference of the scores obtained by the participants in the two research groups were not significant for the Awareness scores on PHLMS (t=1.135, p=.263) (Figure 7), nor for Acceptance (t=.410, p=.684) (Figure 8). So, the collected data did not confirm the sixth and the seventh research hypothesis.

The *Emotional Distress* (EQ) was significantly lower in the experimental condition than in the participants in the control group (t=-10,142, p=.000, d=2.575), confirming the eighth hypothesis (Figure 9).

*Corresponding author, E-mail address: nicoleta.motounu@upit.ro

Current Trends in Natural Sciences
Vol. 10, Issue 20, pp. 192-202, 2021
https://doi.org/10.47068/ctns.2021.v10i20.026
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

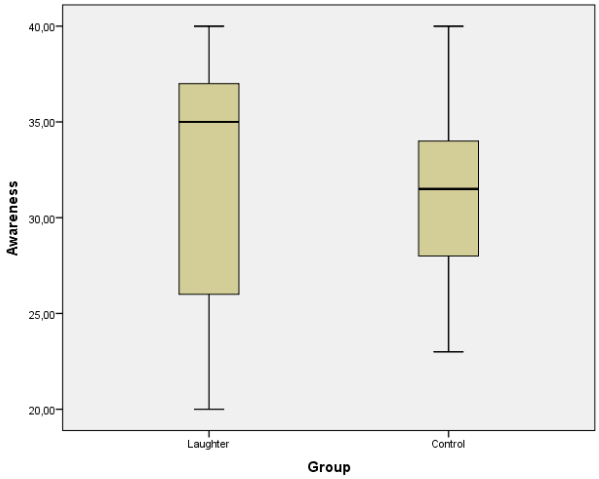

Figure 7: Awareness, assessed with PHLMS, in the experimental (laughter) and the control groups

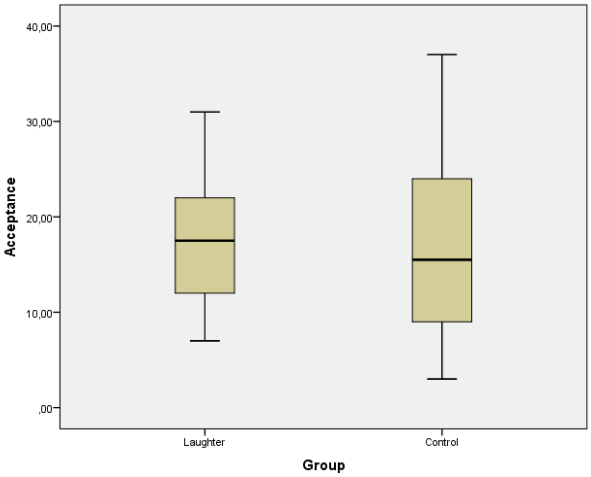

Figure 8: Acceptance, assessed with PHLMS, in the experimental (laughter) and the control groups

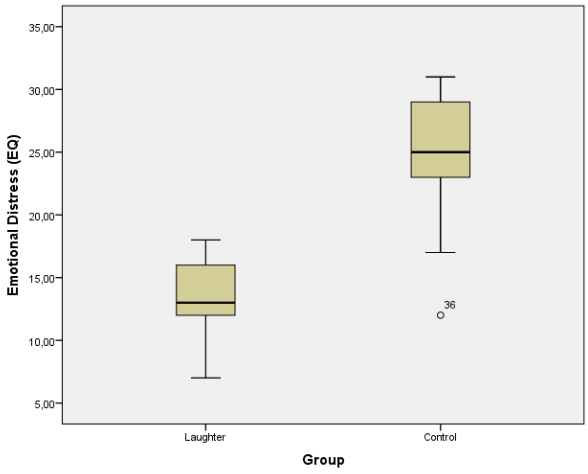

Figure 9: Emotional distress, assessed with QE, in the experimental (Laughter) and the control groups

*Corresponding author, E-mail address: nicoleta.motounu@upit.ro

Current Trends in Natural Sciences
Vol. 10, Issue 20, pp. 192-202, 2021
https://doi.org/10.47068/ctns.2021.v10i20.026
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

Additionally, the scores on the *Affective Response* (EAI) were significantly lower after laughing (experimental condition) when compared with no treatment (t=-4.046, p=.000, d=1.115) (Figure 10).
Also, the *Emotional Regulation* (EAI) was significantly lower in the experimental condition (laughter) than in the control group (t=-3.181, p=.003, d=.939) (Figure 11).
Sensitivity (EQ) was significantly lower in the laughter condition than in the control group (t=-2.137, p=.040, d=0.532), confirming the ninth hypothesis (Figure 12).
There were no significant differences for the Emotions with fictitious characters between the participants in the experimental condition (laughter) and those in the control condition (t=.442, p=.661, d=0.115) (Figure 13).

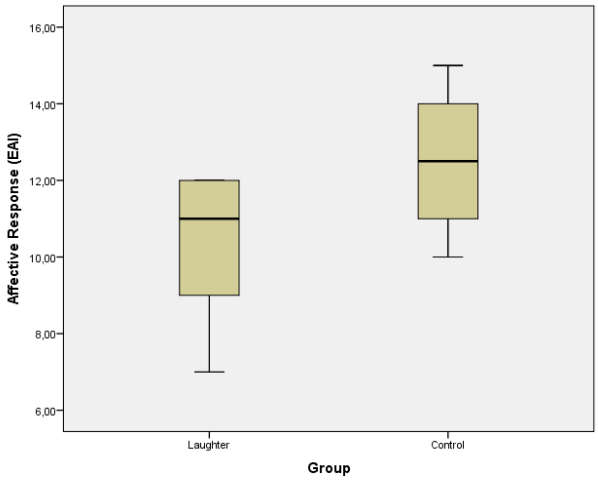

Figure 10: The Affective Response, assessed with EAI, in the experimental (Laughter) and the control groups

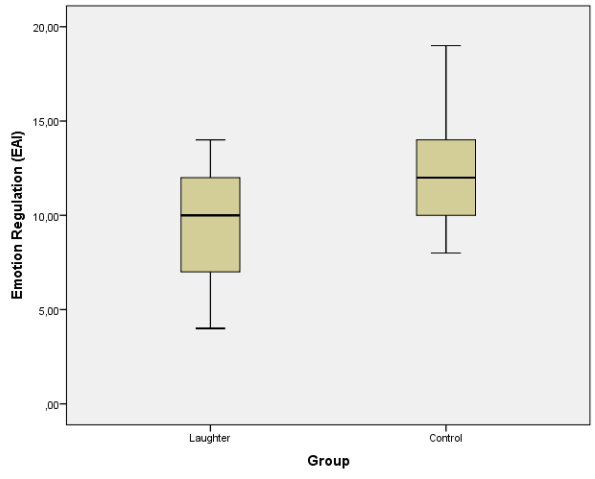

Figure 11: Emotion Regulation, assessed with EAI, in the experimental (Laughter) and the control groups

*Corresponding author, E-mail address: nicoleta.motounu@upit.ro

Current Trends in Natural Sciences
Vol. 10, Issue 20, pp. 192-202, 2021
https://doi.org/10.47068/ctns.2021.v10i20.026
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

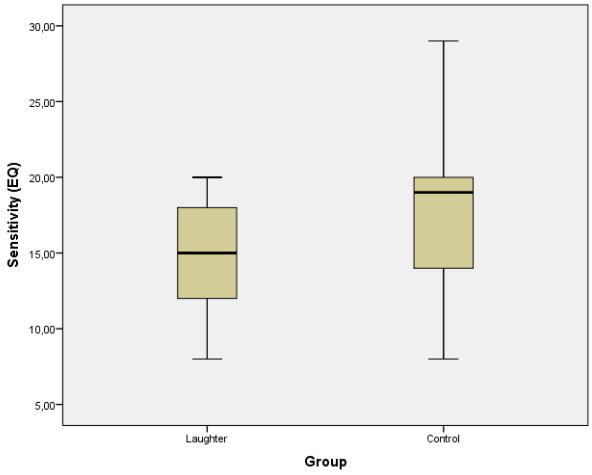

Figure 12: Sensitivity, assessed with QE, in the experimental (Laughter) and the control groups

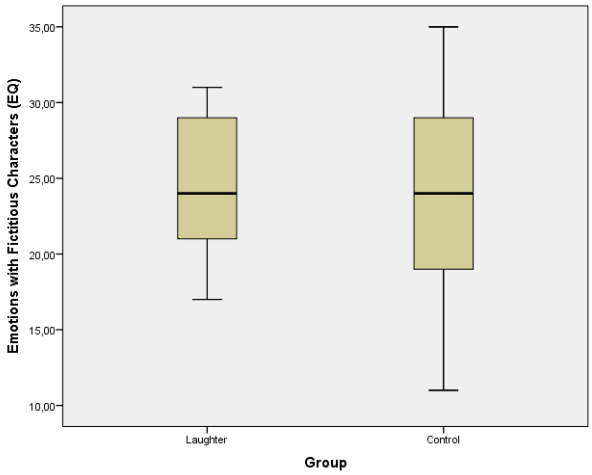

Figure 13: Emotions with fictitious characters, assessed with QE, in the experimental (Laughter) and the control groups

Solitary laughing at a situational comedy significantly decreased the emotional interest (first hypothesis) and the sensitivity (the ninth hypothesis) towards other people. This means that laughter decreased the interest in the emotions of others, also associated with a negative influence on the social abilities, consisting in acting tactful and showing concern for the emotions of others. When not laughing together, laughter may result in insensitive social interactions, with the possible extreme of laughing at another in a difficult situation.

As for the awareness of a perceived other, is decreased after solitary laughter when watching the comedy (the second hypothesis), while the change in self-awareness in relationship with another did not reach statistical significance (the third hypothesis). The awareness and the acceptance of the personal experience in the "here and now" were not affected by the laughter (the sixth and the seventh hypothesis). Although this may be interpreted as a negative outcome, in reality it may show the reaching of a higher objectivity in relationship with another. While the self-assessment of the ability to understand and to predict the emotional states of the other led to lower scores after solitary

*Corresponding author, E-mail address: nicoleta.motounu@upit.ro

Current Trends in Natural Sciences
Vol. 10, Issue 20, pp. 192-202, 2021
https://doi.org/10.47068/ctns.2021.v10i20.026
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

laughing, the ability to make a clear distinction between the emotions resulting from empathising with another and personal affective states was not changed. This may indicate a more refined understanding of the personal experience in relationship, including that of empathic relating. This type of distinctions involves higher order cognitive processing, distinct from being aware of the personal sensorial experience. The physical act of laughing, mobilizing the entire body may not necessarily lead to a higher awareness, but set in motion refined cognitive processing involving the particular, individual ways of acting of the person herself, and the other in the relationship. It involves accepting that the information one has about another depends on the personal way of being and functioning, but also a process of drawing borders between the personal and the other's ways of being, feeling, and acting.

Perspective taking (the fourth hypothesis) had different changes when assessed with different instruments. This highlights a very important nuance: While the actual ability to adopt and understand the perspective of another increased significantly after solitary laughing at a situational comedy, the intention to grasp the other's perspective by using mechanisms like imagination or thinking, decreased. This suggests the passage from an intentional process, using superior cognitive mechanisms which sometimes use previous information and cognitive schemas, to a more intuitive and, also, successful process in the "here and now" of actually "grasping" the perspective of another (involving the resonance at somatic level, engaging similar somatic mechanisms).

The empathetic attitudes decreased after the experimental treatment (the fifth hypothesis). It is important to mention that the items of this scale refer to measures for persons experiencing especially material and not psychological difficulties, and to the expectation of such support from the society/community as a whole, and not personal actions to meet the needs of another not being able to do it form himself. In association with the other results, we may understand that the participants in the experimental group developed a more realistic image of the need for support of the others, on a somatic level, satisfied not necessarily by material means. Solitary laughing at the situational comedy, significantly decreased also the emotional distress (the eighth hypothesis), the affective response, but also the emotional regulation. The persons involved in solitary laughing reported a higher ability to cope with situations eliciting negative emotions. The decrease in the affective response shows a lower emotional contagion, but also, a closer look to the items of the scale allows us to see that they are about contagion with positive emotions, and not negative ones. Laughter also allowed more spontaneous emotional reactions, with a possibility to go from the personal ones to the ones experienced from empathising with another in a flexible, accepting manner, favouring the transformation of negative feelings in positive ones. The simple act of laughing may allow the rapid discharge of negative emotions like tension or frustrations or the mobilization of the organism when experiencing sadness.

In a previous study, laughing at the same comedy increased unconditional self-acceptance and the tendency to prevent expression of anger or to calm down, significantly reduced trait-anxiety and the tendency to express anger, but also anger in general (oriented either externally or internally) (Răban-Motounu, 2018). Similar effects on dysfunctional anxiety, but also an increase of positive emotions was observed after a breathing exercise (Vitalia, 2019). By adding the results of the present study, solitary laughter helps in self-centring and shifting perspective from negative to positive, by releasing emotional tension, and preparing the person for healthy, empathic relationship with others, helping in alleviating distress resulting from empathising with persons in distress.

*Corresponding author, E-mail address: nicoleta.motounu@upit.ro

Current Trends in Natural Sciences
Vol. 10, Issue 20, pp. 192-202, 2021
https://doi.org/10.47068/ctns.2021.v10i20.026
Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521
Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

4. CONCLUSIONS

Laughing at a situational comedy did not affect the awareness and acceptance of personal experience, but it decreased the sensitivity and the interest in others' emotions, perceived other awareness, and the empathetic attitude, or the affective response. While it decreased emotional distress, it also decreased emotion regulation.

Laughter helped the persons to focus on themselves and their negative emotions, becoming aware of them and accepting them, without avoiding them. Thus, they would be more able to become aware of personal needs and the personal resources to satisfy them, instead of focusing on the needs of others and avoiding personal ones. The act of laughing helps in a realistic self-centering, with a higher accent on the personal emotional experiences.

5. REFERENCES

Alcalá-López, D., Vegeley, K., Binkofski, F., Bzdok, D. (2019). Building Blocks of Social Cognition: Mirror, Mentalize, Share. *Cortex, 118*, 4-18. doi: 10.1016/j.cortex.2018.05.006

Baldner, C., McGinley, J.J. (2014). Correlational and exploratory factor analyses (EFA) of commonly used empathy questionnaires: New insights. *Motivation and Emotion, 38*, 727-744. doi: 10.1007/s11031-014-9417-2

Cardaciotto, L., Herbert, J.D., Forman, E.M., Moitra, E., Farrow, V. (2008). The Assessment of Present-Moment Awareness and Acceptance: The Philadelphia Mindfulness Scale. *Assessment, 15*(2), 204-223. doi:10.1177/1073191107311467

Corradini, A., Antonietti A. (2013). Mirror neurons and their function in cognitively understood empathy. *Consciousness and Cognition, 22*, 1152-1161. doi: 10.1016/j.concog.2013.03.003

Cosme, G., Rosa, P.J., Lima, C.F. et al. (2021). Pupil dilation reflects the authenticity of received nonverbal vocalizations. *Scientific Reports, 11*, 3733. doi:10.1038/s41598-021-83070-x

Crespo-Llado, M.M., Vanderwert, R., Roberti, E. et al. (2018). Eight-month-old infants' behavioral responses to peers' emotions as related to the asymmetric frontal cortex activity. *Scientific Reports, 8*, 17152. doi:10.1038/s41598-018-35219-4

Hsu, D. T., Sanford, B. J., Meyers, K. K., et al. (2013). Response of the μ-opioid system to social rejection and acceptance. *Molecular Psychiatry*, *18*(11), 1211–1217. doi:10.1038/mp.2013.96

Krol, K., Kamboj, S., Curran, H. et al. (2014). Breastfeeding experience differentially impacts recognition of happiness and anger in mothers. *Scientific Reports, 4*, 7006. doi:10.1038/srep07006

Li, B., Li, X., Pan, Y. et al. (2018). The relationship between self-enhancing humor and precuneus volume in young healthy individuals with high and low cognitive empathy. *Scientific Reports, 8*, 3467. doi:10.1038/s41598-018-21890-0

Lietz, C.A., Gerdes, K.E., Sun, F., Geiger, J.M., Wagaman, M.A., Segal, E.A. (2011). The Empathy Assessment Index (EAI): A Confirmatory Factor Analysis of a Multidimensional Model of Empathy. *Journal of the Society for Social Work and Research, 2*(2), 104-124. doi:10.5243/jsswr.2011.6

Manninen, S., Tuominen, L., Dunbar, R. I., et al. (2017). Social Laughter Triggers Endogenous Opioid Release in Humans. *The Journal of neuroscience: the official journal of the Society for Neuroscience*, *37*(25), 6125–6131. doi:10.1523/JNEUROSCI.0688-16.2017

Neves, L., Cordeiro, C., Scott, S.K., Castro, S.L., Lima, C.F., (2018). High emotional contagion and empathy are associated with enhanced detection of emotional authenticity in laughter. *Quarterly Journal of Experimental Psychology*, 71(11), 2355-2363. https://doi.org/10.1177/1747021817741800

Nummenmaa, L., Karjalainen, T. (2018). Opioidergic regulation of pain and pleasure in human social relationships. *Neuropsychopharmacology, 43*, 217–218. doi:10.1038/npp.2017.200

Răban-Motounu, N. (2018). Laughter and Well-Being. *Current Trends in Natural Sciences*, *7*(14), 266-271.

Riem, M., van IJzendoorn, M., Tops, M. et al. (2012). No Laughing Matter: Intranasal Oxytocin Administration Changes Functional Brain Connectivity during Exposure to Infant Laughter. *Neuropsychopharmacology, 37*, 1257–1266. doi:10.1038/npp.2011.313

Vitalia, I.L. (2019). The Breath – The Experience of Being Present. *Current Trends in Natural Sciences*, *8*(16), 196-199.

*Corresponding author, E-mail address: nicoleta.motounu@upit.ro