EFFECT OF COMEDY VIDEO CLIP ON AUTONOMIC RESPONSE AND SUBJECTIVE HAPPINESS OF THAI EARLY ADULTS

Saowarath Jantaro[1, 2, *], Winai Sayowan[3], Naiphinich Kotchabhakdi[4], Sompoch Iamsupasit[1]

[1]Developmental Psychology program, Faculty of Psychology, Chulalongkorn University, Bangkok 10330, Thailand
[2]Department of Biochemistry, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand
[3]Kanchanabhisheak Institute of Medical and Public Health Science Technology, Nonthaburi 11150, Thailand
[4]Stem Cell Research and Development Project, Research Center for Neuroscience, Institute of Molecular Biosciences, Mahidol University, Salaya, Nakhonpathom 73170, Thailand

ABSTRACT: In order to understand the association between positive emotional state and autonomic response as our purpose, the changes in subjective emotional states and electrocardiogram (ECG) indicators elicited by comedy video clip viewing were investigated in 40 healthy participants, aged between 18 – 26 years (M = 22, SD = 2.6). All participants who had normal vision were assessed their autonomic nervous response by ECG measurements, including heart rate (HR), respiratory rate (RR), SpO_2 level and skin temperature (ST), and further invited to scale the intensity of their positive feelings by the subjective emotional experience measure after watching neutral and comedy video clips. The self-evaluation of participants was confirmed that our comedy video clip used in this study enabled to evoke their subjective happiness, especially amusement with the highest intensity difference between neutral and comedy video clips. The significant correlation between each positively emotional state elicited by video clip viewing was also observed under the subjective happiness. Although the differences of those total average values on HR, RR, SpO_2 and ST levels did not show apparently between neutral and comedy video clip activations, an increase of SpO_2 level and a decrease of ST level after watching video clips were obviously noted when compared with those levels during eye open event. The HR level was decelerated after watching comedy video clip whereas its increase was induced by neutral video clip. The apparent increase of RR level was occurred during 9 minute-time point sequence of comedy video clip viewing. Comedy-induced changes in respiratory rate were associated with positive emotions including joy, mirth, contentment and happiness whereas saturation of peripheral oxygen (SpO_2) showed a positive correlation with amused feeling. These results indicate that subjective happiness elicited by video clip induces advantage impact on autonomic nervous function.

Keywords: Comedy video clip, Autonomic response, Electrocardiogram, Subjective happiness

INTRODUCTION

There are many kinds on temporarily positive emotions generated by different types of leisure activities. Watching comedy video clip or film is one of many leisure activities which are major sources of happiness depending on a matter of individual choice [1]. The positive emotions usually referred to as subjective happiness in positive psychology [2]. In aspect of happiness, comedy-elicited emotions encompass either of joy [3], mirth [4], amusement [5] and contentment [6]. Nowadays, the interest subjective happiness is measured not only in field of self-report or questionnaire, but also on physiological responses such as electrocardiography (ECG or EKG) [7].

* *Correspondence to: Saowarath Jantaro*
E-mail: saowarath.j@chula.ac.th

Cite this article as: Jantaro S, Sayowan W, Kotchabhakdi N, Iamsupasit S. Effect of comedy video clip on autonomic response and subjective happiness of Thai early adults. J Health Res. 2014; 28(4): 221-7.

However, there is not much certain findings on the relationship of autonomic nervous responses with emotions. Autonomic measures used in most studies on emotion are mainly classified into 3 groups including 1) cardiovascular measures, such as heart rate (HR), preejection period (PEP) and skin temperature (ST), 2) respiratory measures, such as respiratory rate (RR) and saturation of peripheral oxygen (SpO_2), and 3) electrodermal measures, such as skin conductance level (SCL) [8]. The differences on physiological functions are then possibly induced by differently feelings, for example the HR patterns were different between positive and negative emotions [9] that recently reported that a tight relation to the changes of diastolic and systolic blood pressure and heart rate during mood induction [10]. Moreover, respiratory patterns showed the shortest mean breath lengths during subjective happiness while the longest and intermediate mean breath lengths were observed during anger and sadness, respectively [11]. Recently, it was meta-analyzed on literature review that emotion-specific patterns of autonomic nervous activities may be greater in negatively than positively emotional states [12]. The purpose of the present study was then to investigate the effect of comedy video clip on subjective happiness state and autonomic nervous system. Neutral video clip viewing was performed as a control condition. Finally, to better understand the interplay between subjective emotional state and physiological response, we analyzed their correlation during both neutral and comedy viewing conditions.

METHODS

Participants

The sample included 40 early adults (21 females, 19 males) ranging in age from 18 to 26 years (M = 22, SD = 2.6). Sample size determination was calculated from the difference of HR value between open eye step (base line) and comedy clip viewing (N=30). However, to account for the expecting drop outs during the experiment and ensure the study confidence, more than 20% of subjects were recruited. Then, there were 40 subjects recruited by announcement. Participants, who met criteria of this study, were recruited through a volunteer sampling. None of them reported any neurological disorders, psychiatric diseases, or were on medication. All participants had normal or corrected to normal vision. Participants were excluded in cases of; eye accidents that might affect to the sense of vision, women who had menstruating, drowsiness before experiment, taking caffeine and alcohol for two hours before the experiment. The study areas were performed at Chulalongkorn University located in Bangkok and Mahidol University, Salaya Campus located in Nakornpathom province, Thailand. This study was approved by the Ethics Committee of Chulalongkorn University, Bangkok, Thailand (COA No. 035/2555, 28 Feb 2012 – 27 Feb 2013). Participants provided written informed consent.

Instruments

1.1 Video clips

There were two video clips containing positive emotion "comedy" and "neutral" emotion as a control. Comedy video clip was a series of "Mr.Bean at an exam" whereas neutral film was a scene of long distance driving. Each video clip was about 5-10 minute long, color and no sound. Index objective congruence (IOC) values of neutral and comedy video clips from two groups of 60 participants (bachelor students attending a general education subject in Chulalongkorn University) in counterbalance order of video clip viewing were .800 and .883, respectively.

1.2 Subjective emotional experience (SEE) measure

The measure was an analog scale. The measure reliability was done by 126 participants, bachelor students attending a general education subject in Chulalongkorn University. Cronbach's α values of this measure during viewing neutral and comedy video clips were .903 and .975, respectively.

1.3 Electrocardiographic recording

The ECG instrument, Life Scope 8 Bedside monitor (Nihon Kohden, Japan), was located at Panyawattana Building, National Institute for Child and Family Development, Mahidol University, Salaya Campus. Heart rate (HR) and respiratory rate (RR) were recorded simultaneously in real time. Parameters were measured every one minute using Life Scope 8 Bedside monitor instrument with the participant seated in a comfortable chair. The ECG electrode 3-leads were connected to participant's body at left and right infraclavicular fossa, and left anterior axillary line below the bottom rib. SpO_2 level was measured using a pulse oximeter whereas skin temperature (ST) measurement was performed by applying a temperature sensor on participant's back of the hand.

Procedure

After arriving to the laboratory, participants were provided the information and tutorial of this study, informed consent was then obtained. Participants were seated in a comfortable chair and applied ECG electrodes on their body (as described

Table 1 Mean, *SD* and *t* values of subjective emotional state elicited by both neutral and comedy video clips

Subjective emotional state	N	Average rating score				Δ^1	*t value*
		Neutral video clip		Comedy video clip			
		Mean	*SD*	Mean	*SD*		
Joyful	40	3.160	2.513	6.190	1.919	3.030	8.470*
Mirth	40	3.065	2.691	6.413	1.915	3.348	8.242*
Amused	40	2.310	2.613	6.908	1.977	4.598	10.887*
Content	40	3.468	2.454	7.093	1.871	3.625	9.276*
Happy	40	3.638	2.550	7.070	1.791	3.433	9.219*

[1]Δ is calculated by subtracting the average score of neutral video clip from that of comedy video clip. *$p < .01$

Table 2 Pearson (*r*) correlations of subjective emotional states during neutral and comedy clip viewings

(A) Neutral clip viewing (n=40)

	Pearson (*r*) correlation				
	Joyful	**Mirth**	**Amused**	**Content**	**Happy**
Joyful	1	.947*	.877*	.894*	.837*
Mirth		1	.913*	.904*	.834*
Amused			1	.858*	.792*
Content				1	.815*
Happy					1

*$p < .01$

(B) Comedy clip viewing (n=40)

	Pearson (*r*) correlation				
	Joyful	**Mirth**	**Amused**	**Content**	**Happy**
Joyful	1	.923*	.796*	.796*	.770*
Mirth		1	.794*	.827*	.831*
Amused			1	.853*	.797*
Content				1	.913*
Happy					1

*$p < .01$

in 2.3). They were asked to look at the TV monitor placed in front of them, 1 meter distance, and to concentrate on the video clip. ECG recoding was done simultaneously during the experiment set. There were 2 experiment sets in counterbalanced order. First set was sequenced by beginning with (1) closing eyes for 3-5 min; (2) opening eyes for 5-6 min; (3) a 5-10 min neutral-video clip period, and SEE measure rating; (4) a 5-10 min comedy-video clip period, and SEE measure rating. Second set was ordered by starting with closing eyes for 3-5 min; (2) opening eyes for 5-6 min; (3) a 5-10 min neutral- video clip period, and SEE measure rating; (4) a 5-10 min comedy- video clip period, and SEE measure rating. As mentioned above after each video clip viewing, participant was asked to assess self-report rating on SEE measure which took a short time about 1-2 min to complete.

RESULTS AND DISCUSSION

Effect of video clips on subjective emotional state

Indicators of subjective emotional experience using SEE analog rating scale were compared between two clips in order to scope the target emotions elicited. The result, analyzed by both descriptive statistics of mean and standard deviation, and *t*-test for dependent groups of Repeated-Measures Design, is shown in Table 1. Comedy video clip elicited significantly each subjective emotional experience in higher intensity than that elicited by neutral video clip. "Contentment" and "happiness" reported as the two most emotion experienced in both clips. However, the most experienced emotion of "amusement" showed the highest intensity difference (Δ) between neutral and comedy video clips ($\Delta = 4.598$, $t = 10.887$, $p = .000$). Although the score of positive emotional response elicited by comedy video clip was about 60-70% (*M* values ranging from 6 to 7) compared to the maximum score of 10, the subjective ratings of emotional experience to video clips confirmed that participants were able to induce the expected emotions. This result is insistent with the descriptions of elicited emotion state for comedy video clip were "happiness" [13], "amusement" [5], as well as the combined emotion

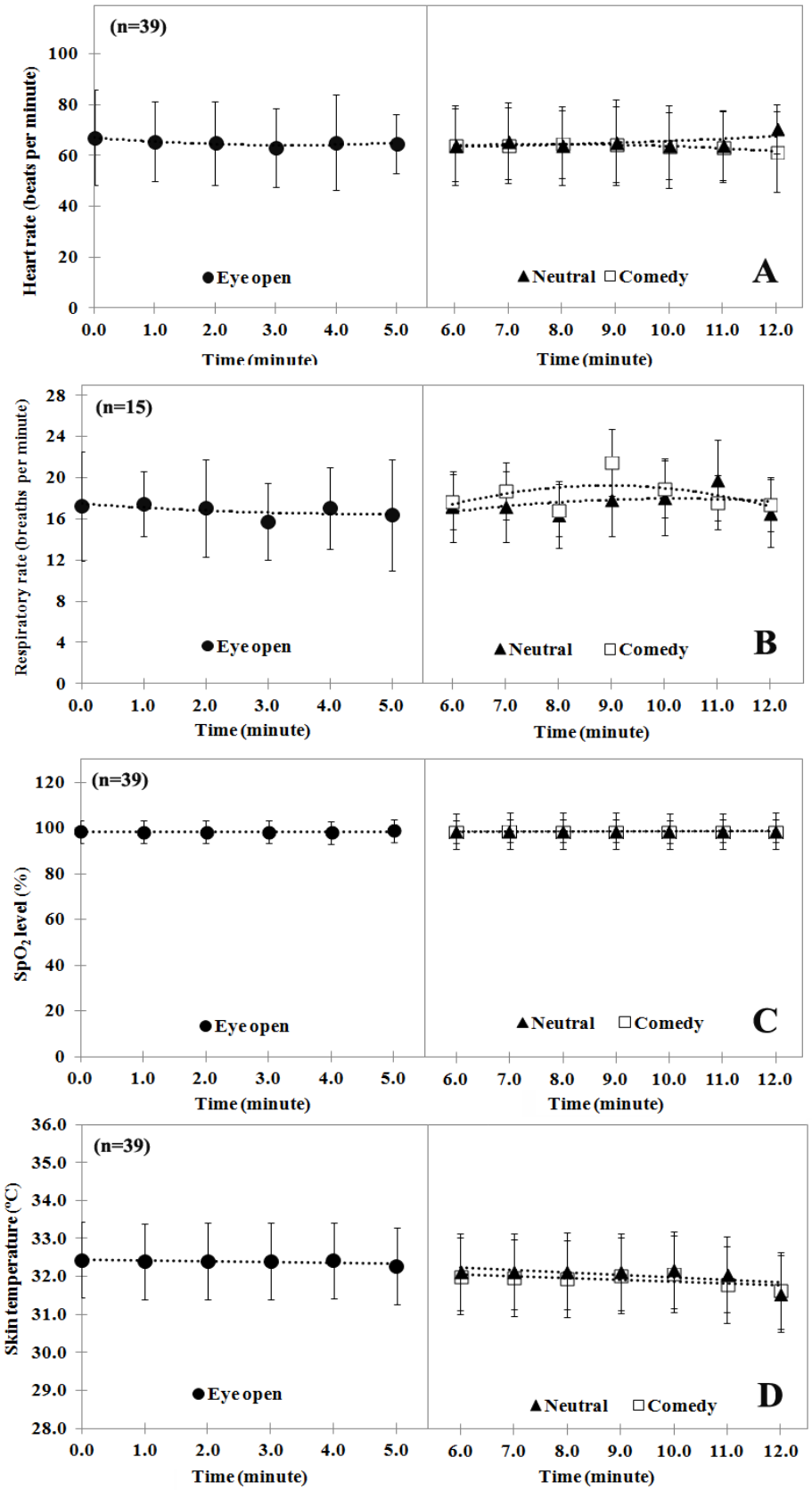

Figure 1 Mean and *SD* values of ECG indicators including heart rate (A), respiratory rate (B), SpO_2 (C), and skin temperature (D) during eye open event (5 minute-long) and video clip viewing (6 minute-long)

Table 3 Mean (*M*), *SD* and *t* values of ECG indicators during eye open event (5 minute-period) and video clip viewing (6 minute-period)

ECG indicators	n	Eye open (EO)	Neutral (N)	Comedy (C)	*t value*		
					EO and N	EO and C	N and C
		M* ±*SD	***M* ±*SD***	***M* ± *SD***			
HR[1]	39	65.2 ± 15.7	64.6 ± 14.1	63.9 ± 13.9	.680	.969	.862
RR[1]	15	16.8 ± 3.4	17.6 ± 5.9	18.5 ± 6.7	.667	1.016	.879
SpO_2 (%)	39	98.36 ± 0.86	98.65 ± 0.87	98.67 ± 0.89	3.245*	3.481*	.076
ST (°C)	39	32.4 ± 1.5	32.1 ± 1.7	31.9 ± 1.8	2.890*	3.237*	1.506

[1]Units of HR (heart rate) and RR (respiratory rate) are beats per minute, and breaths per minute, respectively *$p < .01$

Table 4 Pearson (*r*) correlations between ECG indicators and subjective emotional states

		Joyful	Mirth	Amused	Content	Happy
HR	Neutral	-.070	-.177	-.086	-.100	-.040
(n=39)	Comedy	.064	.109	.262	.261	.213
RR	Neutral	-.092	-.173	.088	-.124	-.087
(n=15)	Comedy	-.610*	-.573*	-.514	-.652*	-.568*
SpO_2	Neutral	.026	-.094	.054	-.008	.152
(n=39)	Comedy	.245	.284	.340*	.190	.235
ST	Neutral	-.228	-.187	-.156	-.261	-.324*
(n=39)	Comedy	-.069	-.048	-.016	.033	-.047

*$p < .05$

of "happiness/amusement" [14]. Recently, Herring and colleagues [7] used terms of "joy and amusement" rather than "happiness" caused by their beliefs that happiness may encompass both of these emotional states. This is consistent with the present study when Pearson (*r*) correlation indicated that subjective happiness elicited by either neutral or comedy video clip used in this study was related significantly with subjective emotion responses of joy, mirth, amusement and contentment (all *ps* < 0.01),Table 2.

Effects of video clips on autonomic responses

The ECG signals monitored were heart rate (HR), respiratory rate (RR), saturation of peripheral oxygen (SpO_2) and skin temperature (ST). Only one participant with bad ECG signals of HR, SpO_2, and ST was excluded from the data calculation. The data from respiratory rate (RR) of participants could be detectable only in 15 participants due to the disturbance program during experiment.

Cardiovascular measures

During a period time of each video clip viewing, HR of participants showed a deceleration tendency during comedy clip viewing compared to that of neutral clip viewing at 12 minute-time point sequence (Figure 1A). Although the HR average value showed a decrease during either neutral or comedy clip viewing compared with that in eye open period, the *t* value gave no significant change (Table 3). Normally, the typical HR of healthy resting state, lying down but awake, in adults is about 60-80 beats per minute, and it was interestingly in previous report that HR decelerated during positively emotional state generally is a characteristic response to visual stimulus such as emotional films [15]. On the other hand, skin temperature (ST) of participants was decreased during each clip viewing ($p_{EO\&N}$ = .006, $p_{EO\&C}$ = .003), Figure 1D. However, comedy video clip affected on ST as similar level as neutral video clip did. The results suggest that focusing concentration led to decrease skin temperature. Previous findings reported that the different areas of skin temperature, such as forehead, eyes, cheeks, palm, fingers and fingertips, responded differently to positive and negative film clips [16]. Moreover, lowering peripheral skin temperature also caused greater oxygen saturation [17].

Respiratory measures

The *t* value showed no significant difference of total average RR level in each period between neutral and comedy video clips, even the higher RR level activated by comedy clip was observed (Table 3). However, the highest of average RR level was prominently activated at 9 minute-time point sequence of comedy video clip (Figure 1B). Usually, the variation of average RR in healthy adult at normal condition is in a range of 12-20 breaths per minute [18]. Etzel and co-workers [19] reported earlier that the happiness induced-music clips potentially increased respiratory activity. On the other hand, increases of SpO_2 level activated by both neutral and comedy video clips was

demonstrated significantly compared with that in eye open period ($p_{EO\&N}$ = .002, $p_{EO\&C}$ = .001), Table 3, Figure 1C. This would be related to the lowered peripheral skin temperature affected by video clip viewing as mentioned above.

The association between physiological responses and positively emotional states was supplemented in order to better understanding their interplay (Table 4). Pearson (*r*) correlation indicated significantly that the decrease of respiratory rate affected by comedy video clip related with the increases on joyful, mirth, content and happy states, except amused emotion. The activated level of saturation of peripheral oxygen possessed an apparent correlation with the induction of amused emotion elicited by comedy clip.

CONCLUSIONS

Altogether, we found that comedy video clip could activate the significant response on physiology, as well as their interplay. Our findings suggest that although comedy video clip is used to evoke subjective happiness or any positively emotional states, researchers should be careful that their findings on autonomic responses may be specific to joy or amusement only, but may not generalize to other emotional states. However, these results indicate that subjective happiness elicited by video clip induces advantage impact on autonomic nervous function. The generalization of comedy effect is probably applied to exert positively autonomic nervous activation into varied samples in varied span of age.

LIMITATIONS

This part of research is a study that no attempt was made to engage in random sampling, participants were volunteers. Moreover, the small sample size (n=15) of respiratory rate (RR) experiment in using correlation analysis as inferential statistics may violate the assumption of metric and reliable variable. On the other hand, the number of comedy video clips should be varied and compared in future study.

ACKNOWLEDGEMENT

We would like to thank Dr. Vorasith Siripornpanich, MD and Mr. Teerut Piriyapunyaporn, at Panyawattana Building, National Institute for Child and Family Development, Mahidol University, Salaya Campus, for experimental consulting, and generous guidance of ECG trainings and program calculation.

REFERENCES

1. Hills P, Argyle M. Positive moods derived from leisure and their relationship to happiness and personality. Pers Individ Dif. 1998; 25(3): 523-35.
2. Ekman P. An argument for basic emotions. Cogn Emot. 1992; 6(3-4): 169-200.
3. Hubert W, de Jong-Meyer R. Autonomic, neuroendocrine, and subjective responses to emotion-inducing film stimuli. Int J Psychophysiol. 1991; 11(2): 131–40.
4. Goel V, Dolan RJ. Social regulation of affective experience of humor. J Cognitive Neurosci. 2007; 19(9): 1574–80.
5. Giuliani NR, McRae K, Gross JJ. The up- and down-regulation of amusement: experiential, behavioral, and autonomic consequences. Emotion. 2008; 8(5): 714-9.
6. Fredrickson BL, Mancuso RA, Branigan C, Tugade MM. The undoing effect of positive emotions. Motiv Emot. 2000 Dec; 24(4): 237–58.
7. Herring DR, Burleson MH, Roberts NA, Devine MJ. Coherent with laughter: Subjective experience, behavior, and physiological responses during amusement and joy. Int J Psychophysiol. 2011 Feb; 79(2): 211-8.
8. Kreibig SD. Autonomic nervous system activity in emotion: a review. Biol Phychol. 2010 Jul; 84(3): 394-421.
9. Ekman P, Levenson RW, Friesen WV. Autonomic nervous system activity distinguishes among emotions. Science. 1983 Sep; 221(4616): 1208-10.
10. Schwartz GE, Weinberger DA, Singer JA. Cardiovascular differentiation of happiness, sadness, anger, and fear following imagery and exercise. Psychosom Med. 1981 Aug; 43(4): 343-64.
11. Collet C, Vernet-Maury E, Delhomme G, Dittmar A. Autonomic nervous system response patterns specificity to basic emotions. J Auton Nerv Syst. 1997 Jan; 62(1–2): 45–57.
12. Cacioppo JT, Berntson GG, Larsen JT, Poehlmann KM, Ito TA. The psychophysiology of emotion. In: Lewis R, Haviland-Jones JM, editors. The handbook of emotion. 2nd ed. New York: Guilford Press; 2000. p. 173–91.
13. Dawkins L, Acaster S, Powell JH. The effects of smoking and abstinence on experience of happiness and sadness in response to positively valenced, negatively valenced, and neutral video clips. Addict Behav. 2007 Feb; 32(2): 425–31.
14. Roberts NA, Levenson RW. Subjective, behavioral, and physiological reactivity to ethnically matched and ethnically mismatched film clips. Emotion. 2006 Nov; 6(4): 635–46.
15. Bradley MM, Lang PJ. Emotion and motivation. In: Cacioppo JT, Tassinary LG, Berntson, GG, editors. Handbook of psychophysiology. 3rd ed. New York: Cambridge University Press; 2007. p. 581–607.
16. Rimm-Kaufman SE, Kagan J. The psychological significance of changes in skin temperature. Motiv Emot. 1996 Mar; 20(1): 63-78.

17. Hom C, Vasquez P, Pozos RS. Peripheral skin temperature effects on muscle oxygen levels. J Therm Biol. 2004 Oct-Dec; 29(7-8): 785-9.
18. Beckett BS. Illustrated human and social biology. Oxford: Oxford University Press; 1995.
19. Etzel JA, Johnsen EL, Dickerson J, Tranel D, Adolphs R. Cardiovascular and respiratory responses during musical mood induction. Int J Psychophysiol. 2006 Jul; 61(1): 57 – 69.