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THE EFFECT OF A SELF-SUPERVISION MODEL BASED ON AUTHENTIC MOVEMENT AND EPIMOTORICS' ON EMOTION-RELATED PHYSIOLOGICAL PARAMETERS AMONG DANCE MOVEMENT THERAPISTS

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ABSTRACT. ***Introduction:*** This is part of a larger study examining the effects of an original self-supervision model (SSM), based on Authentic Movement and Epimotorics', on novice dance movement therapists. The larger study examines movement parameters, psychological parameters, and physiological measures, while the present study focuses on the emotion-related physiological parameters of pulse and oxygen saturation. Used regularly in medical settings, these have also been found to reliably reflect a person's emotional state (Appelhans & Luecken, 2006; Porges, 2007; Picard, 1997). ***Objective:*** To see whether the SSM training affects participants' pulse and oxygen saturation. The hypothesis is that there will be a decrease in pulse variables and increase in oxygen saturation after the SSM training, which would reflect lower emotional arousal and stress. ***Methods and Materials:*** Pulse oximetry was used to measure pulse and oxygen saturation. These were recorded before and after a simulation at the start of the SSM training, and before and after a simulation at the end of the training. To detect changes in pulse variables according to the time of measurement (before and after each simulation), a series of paired-samples t-tests was performed: The first series compared the 'after' measurements of both simulations. The second series compared the 'before' measurement of Simulation 1 to the 'after' measurement of Simulation 2. ***Results****:* The training affected all measures, showing a significant decrease in pulse variables in Simulation 2 (after) compared to the beginning of Simulation 1 (before). ***Conclusion:*** The results suggest that the SSM decreases stress, as reflected in decreased pulse variables.

Key words: *Emotion-related physiological parameter, heart rate, oxygen saturation, Pulse oximeter*

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Introduction

The supervision model examined in this study is a model for self-supervision, a framework that therapists can use to guide themselves and approach challenging issues that arise in their work. The self-supervision model (SSM) is intended to offer therapists a basis for self-development, including professional development in such areas as regulation of emotional response, decreased stress, and increase sense of self-worth as a professional. These skills would help the therapists provide beneficial therapy to their clients in the therapy setting (Watkins, 1997). The specific self-supervision model, developed by the researcher and tested in the study, is based on two modalities of work used in the field of dance movement therapy: Authentic Movement and Epimotorics'. In this study, the participants' pulse and oxygen saturation were measured, as a way to potentially detect changes in stress levels and emotional/psychological/mental state. Studies indicate that there is a direct connection between these physiological parameters and a person's emotional state (Porges, 2007). Decreased stress levels and the ability to regulate levels of emotional arousal could improve therapists' psychological state and increase their sense of self-efficacy in their work.

Studies including Calderón (2016) and Tiwari et al. (2015) examined the relationship between emotional state and physiological measures. Research in the fields of medicine, sports, and psychology have demonstrated that there is a reliable connection between them; heart rate and oxygen saturation, and the changes occurring in them, are two physiological measures that have been demonstrated to provide a reliable reflection of a person's state of emotional arousal, in the absence of existing medical conditions (Davila, Lewis, & Porges, 2017).

The two physiological measures used here, pulse and oxygen saturation, can be defined as follows: <u>Pulse</u> refers to the contraction and expansion of the arteries as blood is pumped by the heart. Pulse is measured in terms of the number of beats per minute (BPM). Because the pulsing of the arteries occurs as a direct result of the heart beating, the pulse rate is equal to the heart rate. Measuring pulse, which can be done using a range of spots on the body, thus makes it easy to measure heart rate. <u>Blood oxygen saturation</u> (SpO_2) refers to the percentage of oxygenated hemoglobin present in the blood, out of all the hemoglobin in the blood. Optimal SpO_2 is between 94% and 100% (Tusman, Bohm, & Suarez-Sipmann, 2017). Pulse and oxygen saturation are physiological measures that can offer information about a person's physical fitness, however in this study they provide information about the person's emotional state. They are used here to examine the emotional/psychological effects of the SSM on the novice dance movement therapists who participated in the study.

Research Design and Methodology

The present article presents a study that is part of a larger research study exploring the effects of a unique self-supervision model on novice dance movement therapists.

The study population consisted of six participants in their first few years of practicing therapy, from the Jerusalem region in Israel. The participants did not suffer from any medical limitations. 50% of the group was male and 50% was female, ranging in age from 29 to 38 (M=32.75, SD=3.08). All of the participants hold a Master's degree (M.A).

Research methods: The group of participants underwent training in the self-supervision model. At the beginning of the training, participants were prompted to simulate a situation from their therapy work for which they required supervision ("Simulation 1"). Their pulse and oxygen saturation were measured before this simulation and after it. At the end of the training in the SSM, the participants were again asked to simulate a situation requiring supervision ("Simulation 2"). Their pulse and oxygen saturation were again measured before and after the simulation. Thus participants' pulse and heart rate of participants were recorded at four points in time.

All measurements of pulse and oxygen saturation were performed using a **pulse oximeter**. Although various tools are available for measuring heart rate and oxygen saturation, the pulse oximeter was chosen for this study because it has been widely and extensively researched and is convenient, non-invasive, and provides reliable and immediate results (Mengelkoch, Martin, & Lawler, 1994).

The pulse oximeter is a small device that measures pulse and oxygen saturation when it is placed on a part of the body, often a finger. The device takes its measurements by sending one red and one infrared wavelength of light from one side of the device, through the body part, and to the opposite side of the device, where there is a light detector. The two types of light are thus passed through the body part. Since oxygenated hemoglobin and de-oxygenated hemoglobin absorb these wavelengths differently, the pulse oximeter is able to determine the percentage of blood that is oxygenated. The device measures pulse by measuring the slight changes in blood volume that take place as the arteries expand and contract in conjunction with the heart pumping blood. The results of these two measurements are recorded in the device (Brand, Brand, & Jay, 2002).

Pulse oximeters are regularly used to provide important information about a person's physical state, but they have also been used in various studies to measure physiological indicators of emotion (Calderón, 2016; Aweto, Owoeye, Akinbo, & Onabajo, 2012). Because emotional arousal is reflected in physiological changes such as increased heart rate, one may gain information from physiological measures about a person's emotional state. Pulse oximeters are increasingly used to gain information on physiological parameters that reflect emotional arousal (Harrison, Gray, Gianaros, & Critchley, 2010; Calderón, 2016). In the present study, pulse oximetry is likewise used to record levels of emotional arousal among the participants in order to see whether their ability to regulate their emotional state improves over the course of the training in the SSM. In this study, the pulse oximeter recorded measures before and after Simulation 1 and before and after Simulation 2. Results from different points in time were compared using paired t-tests, standard mean comparisons. Paired t-tests have been found to be appropriate for studies involving a small sample size ((De Winter, 2013; Cahill & Egan, 2017; Brown, 2017).

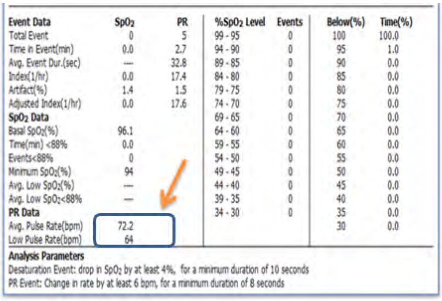
The pulse oximeter also recorded "events," significant increases or decreases in pulse rate, as well as the duration of such events, meaning the amount of time it took for the pulse to return to normal. A decrease in the frequency and duration of such events would reflect increased emotional regulation.

Results

The research hypothesis was that participants' heart rates would decrease and oxygen saturation levels would increase after the training in and practicing of the self-supervision model (SSM) based on Authentic Movement and Epimotorics'. Such a result would reflect decreased levels of emotional arousal among the participants.

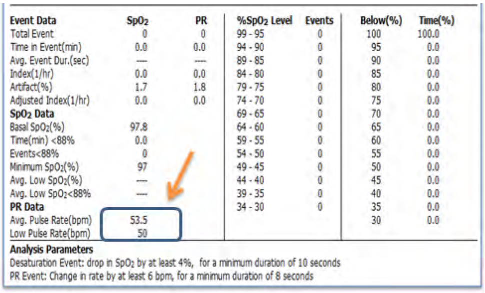
Table 1 shows an example of the measurements recorded for one participant (a 34-year-old male), with the left panel showing the data from the 'before' stage of Simulation 1 and the right panel showing those from the 'after' stage of Simulation 2. The results for this participant show a decrease in heart rate and an increase in oxygen saturation at Simulation 2 as compared with Simulation 1.

Table 1. Pulse oximeter results for male participant, age 34, comparing Simulation 1 ('before') and Simulation 2 ('after')



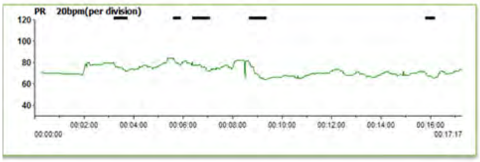
Event Data	SpO2	PR	%SpO2 Level	Events	Below(%)	Time(%)
Total Event	0	5	99 - 95	0	100	100.0
Time in Event(min)	0.0	2.7	94 - 90	0	95	1.0
Avg. Event Dur.(sec)	----	32.8	89 - 85	0	90	0.0
Index(1/hr)	0.0	17.4	84 - 80	0	85	0.0
Artifact(%)	1.4	1.5	79 - 75	0	80	0.0
Adjusted Index(1/hr)	0.0	17.6	74 - 70	0	75	0.0
SpO2 Data			69 - 65	0	70	0.0
Basal SpO2(%)	96.1		64 - 60	0	65	0.0
Time(min) <88%	0.0		59 - 55	0	60	0.0
Events<88%	0		54 - 50	0	55	0.0
Minimum SpO2(%)	94		49 - 45	0	50	0.0
Avg. Low SpO2(%)	----		44 - 40	0	45	0.0
Avg. Low SpO2<88%	----		39 - 35	0	40	0.0
PR Data			34 - 30	0	35	0.0
Avg. Pulse Rate(bpm)	72.2				30	0.0
Low Pulse Rate(bpm)	64					

Analysis Parameters
Desaturation Event: drop in SpO2 by at least 4%, for a minimum duration of 10 seconds
PR Event: Change in rate by at least 6 bpm, for a minimum duration of 8 seconds



Event Data	SpO2	PR	%SpO2 Level	Events	Below(%)	Time(%)
Total Event	0	0	99 - 95	0	100	100.0
Time in Event(min)	0.0	0.0	94 - 90	0	95	0.0
Avg. Event Dur.(sec)	----	----	89 - 85	0	90	0.0
Index(1/hr)	0.0	0.0	84 - 80	0	85	0.0
Artifact(%)	1.7	1.8	79 - 75	0	80	0.0
Adjusted Index(1/hr)	0.0	0.0	74 - 70	0	75	0.0
SpO2 Data			69 - 65	0	70	0.0
Basal SpO2(%)	97.8		64 - 60	0	65	0.0
Time(min) <88%	0.0		59 - 55	0	60	0.0
Events<88%	0		54 - 50	0	55	0.0
Minimum SpO2(%)	97		49 - 45	0	50	0.0
Avg. Low SpO2(%)	----		44 - 40	0	45	0.0
Avg. Low SpO2<88%	----		39 - 35	0	40	0.0
PR Data			34 - 30	0	35	0.0
Avg. Pulse Rate(bpm)	53.5				30	0.0
Low Pulse Rate(bpm)	50					

Analysis Parameters
Desaturation Event: drop in SpO2 by at least 4%, for a minimum duration of 10 seconds
PR Event: Change in rate by at least 6 bpm, for a minimum duration of 8 seconds



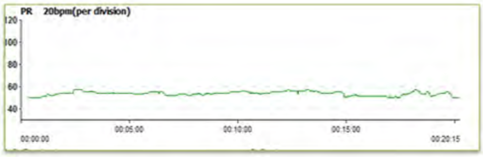


Table 2 presents the baseline descriptive statistics for pulse and saturation variables.

Table 2. Baseline descriptive statistics for pulse and saturation variables (N=6)

	M	SD	Min	Max
Pulse				
Total events	11.00	5.18	5.00	17.00
Time in event (minutes)	5.12	1.26	3.40	7.00
Index	33.55	16.31	13.90	49.79
Saturation				
Basal Sp02%	96.80	3.02	90.7	98.7

In order to detect changes in the pulse and saturation variables according to the time of measurement (before and after), a series of paired-samples t tests were performed. The first series compared the 'after' measurements of both simulations. Table 3 presents significant differences in pulse 'time in event (minutes)' from after Simulation 1 ($t_{(5)} = 3.41$, $p = .02$) and after Simulation 2, showing that there was a decrease in the time in event compared to after the first simulation. No significant differences were found for the rest of the variables.

Table 3. Means and standard deviations for physiological parameters, after the first and second simulation, within the study group (N=6)

	After Simulation 1		After Simulation 2		$t_{(5)}$	p
	M	*SD*	*M*	*SD*		
Pulse						
Total events	9.17	4.12	6.17	5.35	1.75	.14
Time in event (minutes)	4.75	1.25	2.85	2.00	3.41	.02
Index	27.47	11.81	18.85	15.83	1.28	.26
Saturation						
Basal SpO2%	97.38	1.38	97.47	1.07	-0.22	.84

The second series compared the 'before' measurement of Simulation 1 to the 'after' measurement of Simulation 2. Table 4 presents significant and marginally significant differences in pulse 'total events' ($t_{(5)}$ = 4.25, p = .008), in 'time in event' ($t_{(5)}$ = 2.25, p = .074), and in the 'index' calculation ($t_{(5)}$ = 2.66, p = .052): After Simulation 2 there was a pulse decrease when compared with before Simulation 1. No significant differences were found for the saturation basal SpO2%. Figure 1 presents the significant and marginally significant differences in pulse parameters between the simulations.

Table 4. Means and standard deviations for physiological parameters, before Simulation 1 and after the Simulation 2, within the study group (N=6)

	Before Simulation 1		After Simulation 2		$t_{(5)}$	p
	M	*SD*	*M*	*SD*		
Pulse						
Total events	11.00	5.18	6.17	5.35	4.25	.008
Time in event (minutes)	5.12	1.26	2.85	2.00	2.25	.074
Index	33.55	16.31	18.85	15.83	2.66	.052
Saturation						
Basal SpO2%	96.80	3.02	97.47	1.07	-0.51	.63

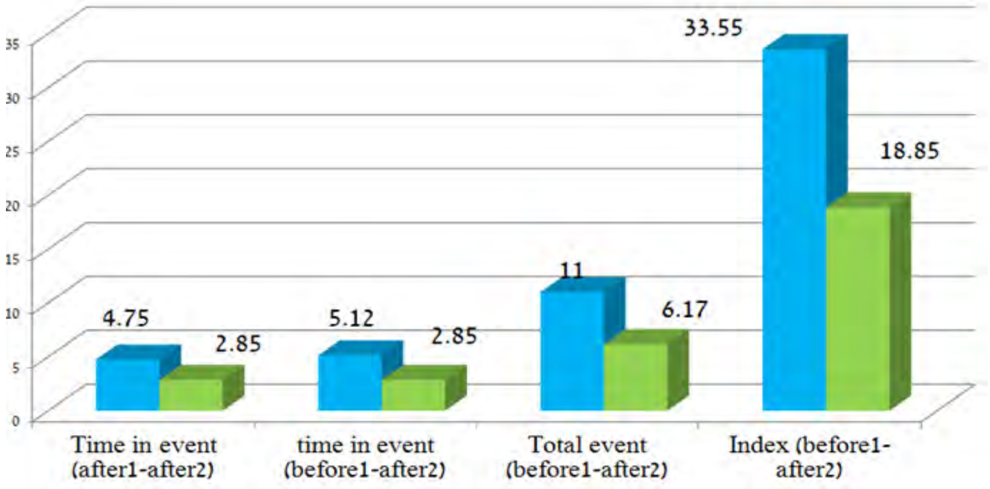


Fig. 1. Differences in time in event, total event, and index parameters, comparing Simulation 1 (blue) and Simulation 2 (green)

Comparing the 'after' measurements of the first and second simulations showed significant differences in accordance with the hypothesis – after Simulation 1 there was a decrease in the time in event. Comparing the baseline measurement of Simulation 1 to the 'after' measurement of Simulation 2 showed significant and marginally significant differences in pulse total events, time in event, and in the 'index' calculation in accordance with the hypothesis – after the second simulation there was a pulse decrease compared to before the first simulation. Nonetheless, no significant differences were found in total events and the index parameter while comparing the 'after' measurements.

Discussion

As discussed above, changes in physiological parameters can reliably reflect changes in emotional arousal and thus emotional/psychological state. The following combination was found in the present study: A decrease in the number and duration of events of pulse changes. There were significant differences in pulse 'time in event (minutes)' ($t_{(5)}$ = 3.41, p = .02) – after Simulation 2 there was a decrease in the time in event compared to after Simulation 1. A significant reduction in Total Events can indicate a decrease in stress and better coping with states of emotional arousal and anxiety.

In light of the fact that the participants are healthy adults with no medical issues and based on the connection between changes in emotional state and changes in physiological parameters, the decrease in pulse variables can be understood as a decrease in stress levels and an increased ability for emotional regulation (Picard, 1997). Although oxygen saturation levels did not increase in statistically significant numbers, as hypothesized, there was an increase in this measure among all the participants. Perhaps the increase was not statistically significant because the baseline levels of oxygen saturation were already high (SpO_2 96.8%).

Conclusion

This study produced findings regarding the effects of a unique self-supervision model (SSM) on novice dance movement therapists. The findings show a clear impact of the training in the self-supervision model on the participants in the area of emotion-related physiological parameters, namely pulse and oxygen saturation.

The fact that in all the measurements there was a decrease in Simulation 2 (after) when compared to the beginning of Simulation 1 (before) demonstrates that the SSM had the effect of decreasing stress levels and emotional arousal. This may point to the ability of the supervision model to enhance therapists' skills in the area of emotional self-regulation, a crucial skill in offering successful therapy.

The results of this study support the hypothesis that practicing the self-supervision model based on Authentic Movement and Epimotorics' can improve emotion-related physiological parameters of novice dance movement therapists.

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