"Unlocking the secrets of fascia: How fasciatherapy-inspired facial and body massage boosts skin health and well-being"

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1. Introduction

Massage is recognized for its various health benefits, including relaxation and stress reduction [1]. In the literature, facial massage has been described for its effects on the skin to "counteract" the effects of aging [2], as well as its effects on general well-being [2,3]; while body massage has been primarily studied in a therapeutic field [1]. Fasciatherapy is a manual technique offering a holistic approach to body and mind care through fascia manipulation [4]. While the skin has been extensively studied, the fascia network has only recently attracted the interest of researchers and clinicians, particularly in the fields of sport and medicine [5,6]. This connective tissue is closely linked to the skin, forming a single matrix that extends from the body to the head. Indeed, the skin and the "superficial" fascia are two almost inseparable tissues that play both a functional and sensory role [7].

Initially performed on the body fascia for therapeutic purposes, Fasciatherapy massage has been adapted for the face, seeking benefits for both the skin and well-being. This research aims to investigate the impact of this new massage on the skin, emotions, and well-being by combining various measurement methods from biology, clinical studies, and neurosciences.

Two standardized massage protocols were evaluated in 3 studies: a 25-minute face and neck/décolleté massage (*face* massage – study 1 & 2) and a 30-minute upper body massage (*body* massage – study 3).

STUDY 1

An initial study was carried out to evaluate the effects of one *face* massage session on the skin and the emotions felt.

Materials and Methods

Thirty-three women aged 30 to 55 years received the massage performed with a facial serum, while a control group received the serum alone and remained lying at rest for the duration of the massage (CG, N=16). The main inclusion criteria were healthy skin and prior experience with massages in a salon. Exclusion criteria included the presence of signs of a skin disease or a general disease with a proven effect on the skin, and the use of general or dermatological treatment. The massage was performed by an osteopath trained in the massage protocol and Fasciatherapy method. The effects of the *face* massage were measured on skin appearance using clinical evaluations and a self-assessment questionnaire completed by the participants. Clinical evaluations were performed blindly (time and group) on photographs under controlled conditions using a digital grading system by a trained dermatologist. Emotional benefits were assessed with a 10-items questionnaire (11-point visual analog scales). A Wilcoxon test on the relative variation to the initial values was conducted on clinical data. An ANOVA was used as a comparative analysis for the emotional items and self-assessed skin items.

Results

Statistical analyses showed that the serum alone has a significant effect on wrinkle reduction and tend to reduce nasolabial fold ; while the *face* massage comes to reinforce this skin improvement, especially for the reduction of glabellar wrinkles and underneath eye wrinkles (Figure 1).
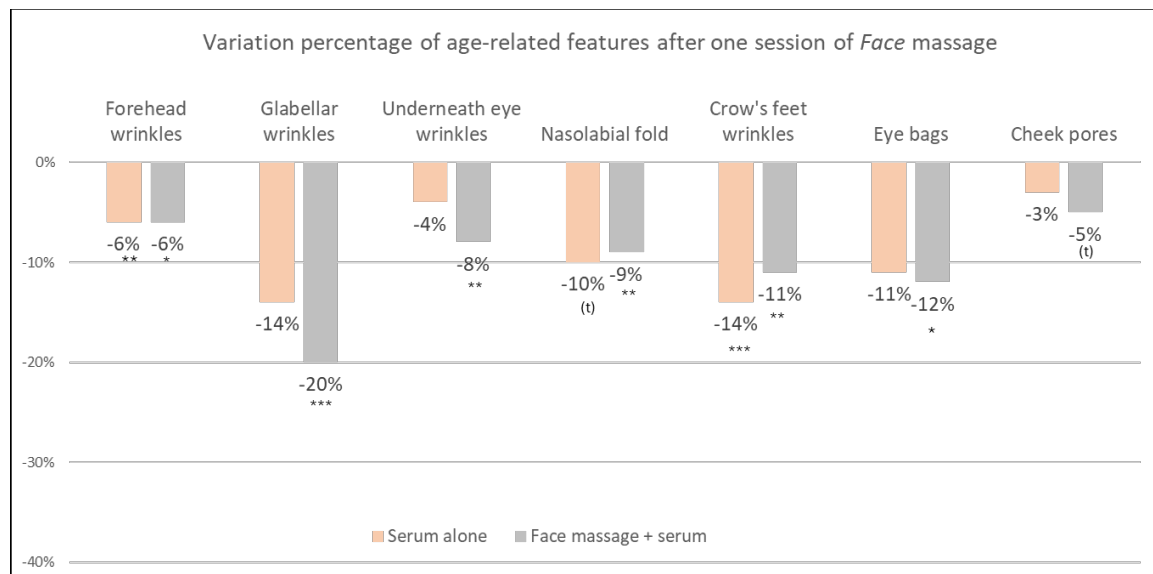

Figure 1. Clinical evaluation. Variation percentage after one session of the *face* massage+ serum on age-related features vs. the serum alone.

After one session of *face* massage, women perceived their skin as more tonic (+39.5% p<0.001 vs. +15.6% in CG), plumper (+46.6% vs. +20.4%), and with a better texture (+32.8% vs. +14.6%) compared to the control group. Positive emotions were enhanced and negative

emotions were reduced in both groups, except for "stimulated" which was significantly unchanged in the control group. Indeed, participants in the massage group felt significantly more stimulated (+46.8% vs. +15.4% in CG, p=0.08), and tended to feel more relaxed (+53.6% vs. 28.2%, p=0.1), and more attractive (+58.4% vs. 24.6%, p=0.1) after the massage compared to the control group (ANOVA).

STUDY 2

To go further, a second study was conducted to explore the long-term effects of six weekly *face* massage sessions on skin, emotions and well-being.

Materials and Methods

The *face* massage was performed by the same professional on 30 women aged 35 to 55 years. The inclusion/exclusion criteria were similar to Study 1; in addition, declaration of sleep problems (excluding diagnosed or treated disorders) was prioritized to evaluate the effects of the intervention on sleep quality.

Skin changes observed after the 6 sessions were evaluated using 1) an imaging system allowing in-vivo characterization of dermal fibers (LC-OCT, DAMAE Medical®, Paris, France), 2) clinical evaluations on photographs, and 3) a self-assessment questionnaire. LC-OCT images allow the extraction of morphological parameters describing dermal fibers such as their degree of anisotropy, sizedensity and number of fibers. These images were taken on the forehead and crow's feet.

Validated questionnaires were used to assess the effects of the 6 sessions on anxiety levels (STAI-S), sleep quality (PSQI), and body awareness (MAIA-2) [8]; and 11-point visual analog scales were used to measure emotional items and general well-being. Additionally, saliva samples were collected before and after the 1st and 6th sessions to analyze the physiological effects of the massage on oxytocin secretion (Enzo, ADI-901-153A), a neuropeptide associated with well-being and particularly with social and affective touch [9]. The experimental design of the study is detailed in Figure 2.
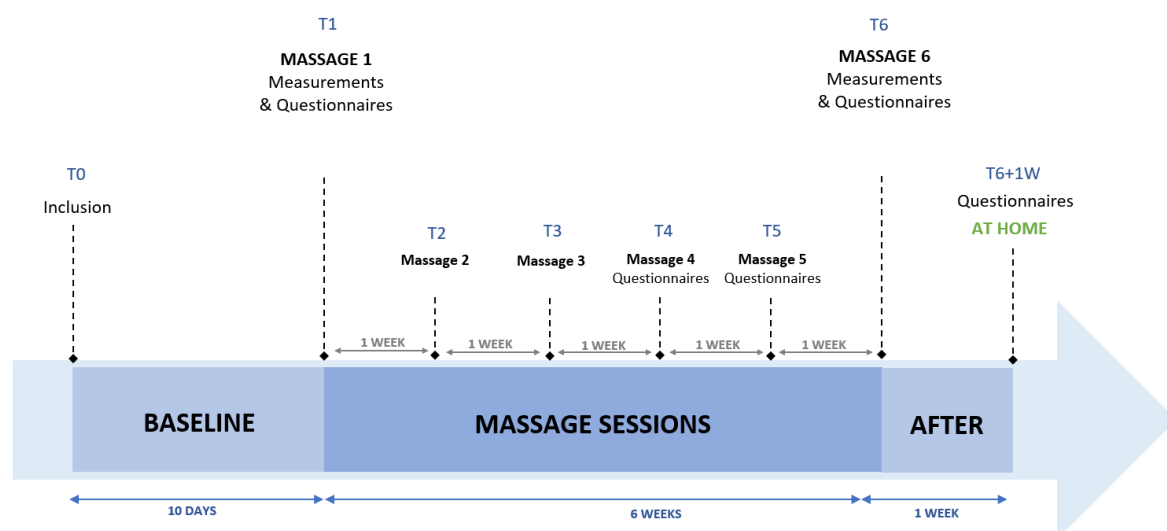

Figure 2. Study 2 experimental design.

For clinical evaluation, a Wilcoxon test on the relative variation to the initial values has been conducted. Given the non-normal distribution of the data, a Friedman test was conducted for the oxytocin analysis. For all questionnaires and dermal fibers analysis, repeated-measures analysis of variance (ANOVA) was used to analyze outcomes across times. Post hoc tests of Tukey (e.g., pairwise comparisons) were undertaken when the ANOVA was significant.

Results

Clinical evaluation

The facial age-related features visibility significantly improved after the 6 sessions of *face* massage, with a reduction of wrinkles such as on the forehead (p=0.002) and the crow's feet area (p=0.016), and a reduction of the eyebag (p=0.016) and pores severity (p=0.008) – see Figure 3. Skin radiance and skin texture/grain fineness were also improved by respectively 10% (p<0.001) and 8% (p<0.001).
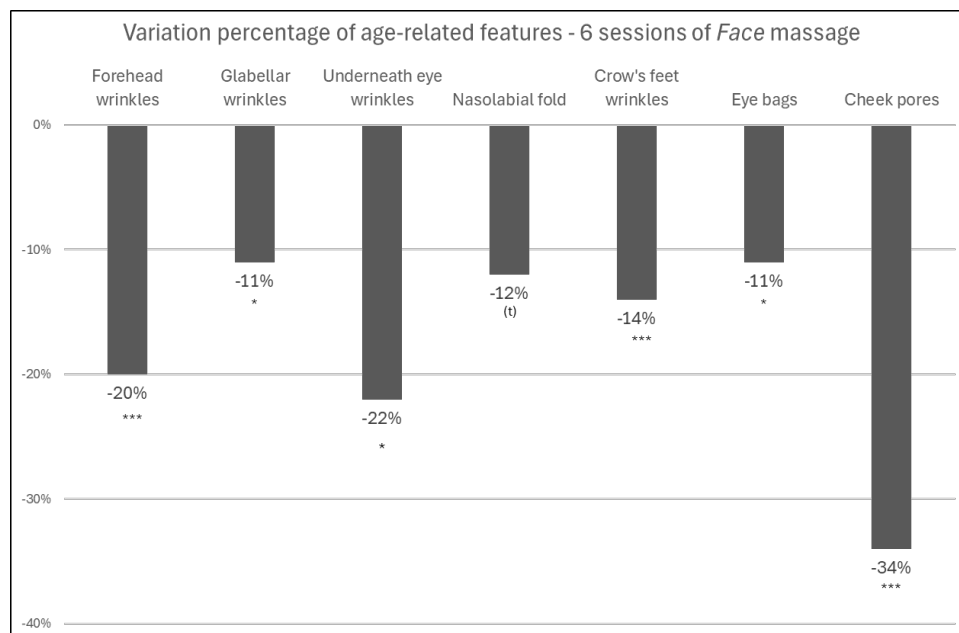

Figure 3. Clinical evaluation. Variation percentage after 6 sessions of *face* massage on age-related features evaluated by a trained dermatologist.

Skin auto-evaluation

Overall auto-evaluated skin items improved positively and similarly after one session or 6 sessions. Interestingly, by comparing baseline mean values at T1 and T6 sessions, there was a significant difference for 4 items : skin tonicity (p=0.015), skin softness (p=0.045), skin radiance (p=0.031) and a trend for healthy glow (p=0.065). These items had higher baseline mean values at T6 vs. T1, indicating a long-term perceived effects.

Dermal fibers by LC-OCT

The effects observed differed according to the skin site with a significant diminution of fiber anisotropy score on the crow's feet area after the 6th massage vs. baseline (p=0.018) (Figure

4). It means that a visible improvement of dermal fibers network organization has been observed on this area, with fibers oriented in more diverse directions compared to the initial state. On the forehead, an increased number of fibers (p=0.009) and a decreased mean size of fibers (p=0.003) were found, suggesting that a fragmentation of the fibers had occurred. It could correspond to the initiation of a regeneration process at the dermal level, it would be consistent with *ex-vivo* findings observed after repeated skin mechanical manipulations [8].
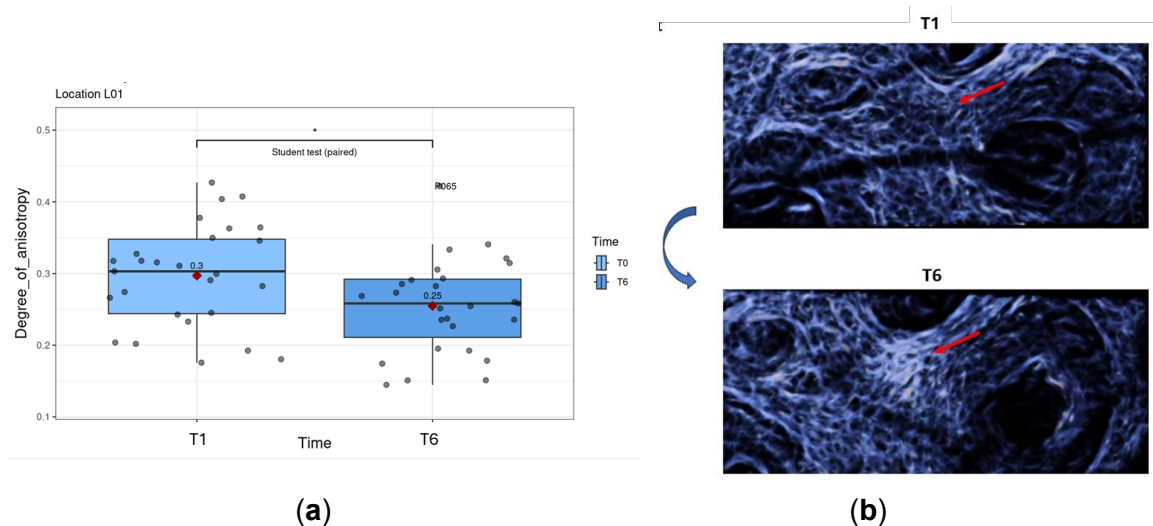

(a)   (b)

Figure 4. Dermal fibers network on the crow's feet area. a. Impact of 6 sessions of *face* massage on dermal fibers anisotropy score. **b**. Visual example of the dermal fibers before and after 6 sessions of the *face* massage.

State anxiety level (STAI-S), sleep quality (PSQI score) and Body awareness (MAIA-2)

The analyses revealed a significant time effect on the STAI-S score (**Figure 5a**). The level of state anxiety decreased significantly from T0 to T6 (p<0.0001) ; but increased significantly from T6 to T6+1W (p=<0.0001) indicating a recovery to baseline 1 week after the end of the massage period. Analysis of variance revealed a significant effect of time on the PSQI score (**Figure 5b**), with a significant decrease from T0 to T6+1W (p<0.0001) indicating a positive effect of the 6 sessions of massage on perceived sleep quality.
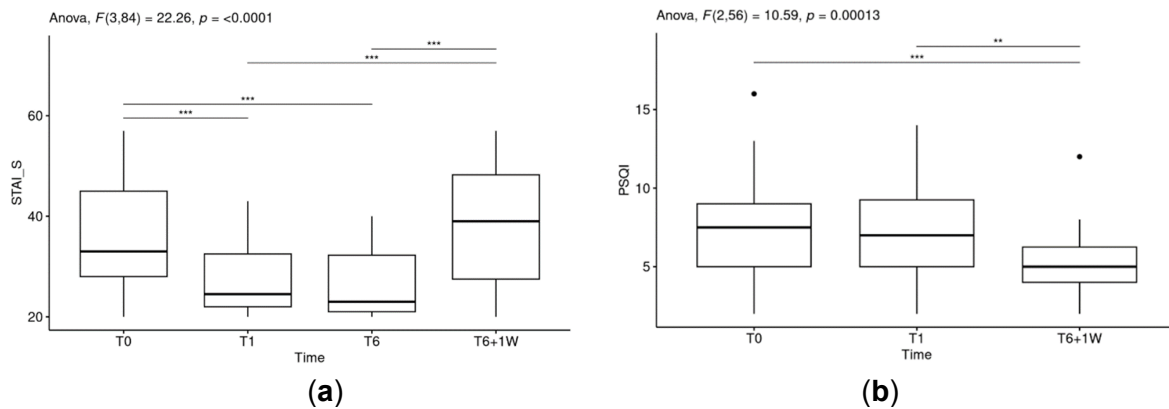
Figure 5. STAI-S and PSQI scores. Impact of the *face* massage on a) the level of state anxiety and b) the perceived sleep quality (the lower the score, the better the sleep quality).

The analyses revealed a significant time effect on 4 of 8 dimensions of the MAIA score : noticing (p=0.0034), attention regulation (p=0.013), emotional awareness (p=0.029), self-regulation (p=0.0057) (**Table 1**). This result suggests an holistic effect of the *face* massage on the whole body.

Table 1. Body awareness dimensions. ANOVA results - comparison between T0 and T6+1W.

VAR	Effect	T1	T6+1W	F value	Pr(>F)	sign
AttentionRegulation	Time	2.444	2.913	7.043	0.013	*
BodyListening	Time	2.810	3.083	2.082	0.160	
EmotionalAwareness	Time	3.514	3.879	5.285	0.029	*
NotDistracting	Time	2.375	2.119	2.193	0.150	
NotWorrying	Time	2.800	2.686	0.594	0.447	
Noticing	Time	3.071	3.696	10.230	0.003	**
SelfRegulation	Time	2.661	3.107	8.970	0.006	**
Trusting	Time	3.000	3.345	2.871	0.101	

Salivary oxytocin level

Salivary oxytocin was increased by 70% after the 1rst massage (Median (IQR): 69 (44-136) vs. 136 (82-215)) and 46% after the 6th massage (89 (76, 144) vs. 166 (97-237)). A significant increase of oxytocin was observed, similarly after the 1rst and the 6th massage (respectively p=0.003 and p=0.012) as described in Figure 6.

Figure 6. Level of salivary oxytocin. Variation after the 1rst and 6th massage.
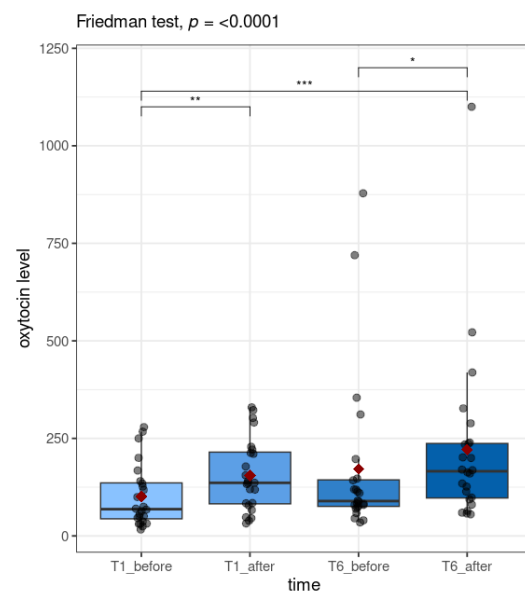
Emotions and Well-being

As for the first study, positive emotions were enhanced (10 items) and negative emotions were reduced (3 items) after the first and the 6th *face* massage. The ANOVA revealed an interaction between the time (massage session) and the moment (before / after the massage) for 2 emotional items. Women felt more comforted (p=0.023) and valued (p=0.0026) after the 6th massage vs. the 1rst massage, these emotions were enhanced across time.

More globally, level of well-being was statistically higher during all the period of massage than before the 1rst massage and the week after the last massage (p<0.0001) (Figure 7). As for anxiety, the benefit obtained on well-being by the *face* massage sessions was not maintained one week later.
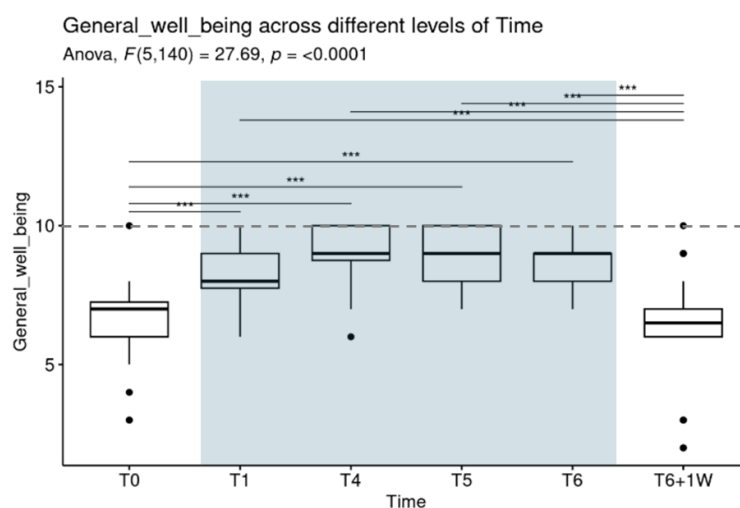

Figure 7. General well-being level across time (blue period corresponds to the 6 weeks of *face* massage).

DISCUSSION ON STUDY 1 & 2

Clinical results of both studies indicate that for certain signs, such as underneath eye wrinkles and glabellar wrinkles, immediate improvement is observed from the first massage. In contrast, other signs like forehead wrinkles and skin texture/cheek pores seem to require multiple massage sessions to see significant improvement. The immediate and long-term effects are not assessed on the same women, so these differences should be taken with caution. Nevertheless, differences in clinical efficacy are to be expected, given the anatomical variability across facial areas and the potential difference in pressure applied during massage. The clinical long-term results are consistent with significant changes found at the microscopic level on the dermal fiber network. Improvements in the anisotropic organization of dermal fibers were observed on the crow's feet areaand a beginning of fiber regeneration seems to occur on the forehead. Additional massage sessions would be beneficial in order to achieve further restructuring changes in the dermal fiber network and reinforce the long-term clinical effects.

The emotional benefits reported after a single massage session in both studies, and the physiological increase in salivary oxytocin secreted after the first massage (and similarly after the 6th massage) in study 2, suggest that these repeated benefits at each session contribute to the observed and maintained well-being throughout the massage period. Indeed, the release of oxytocin through the HPA axis has been proposed to have a role in enhancing well-being, not only through social or affective touch, but also through emotional stimulation [9]

The effects observed on both appearance and well-being have most likely contributed to the reduction of anxiety and the perception of better sleep quality by women after six weeks of intervention. It is particularly interesting to note the improvement of body sensation awareness following the *face* massage sessions, which include the neck and décolleté. This could be explained by the fact that the fascia connects the head and the body through a continuous matrix. The action on the fascia induced by the *face* massage may have had an impact on the sensations felt on the body.

It therefore seems pertinent to explore whether the effects of the *body* massage targeting specifically the fascia of the upper body provides similar emotional benefits as the *face* massage. We have decided to explore more specifically the effects of this massage on relaxation given the results obtained on sleep in study 2, and the known therapeutic benefits in the literature on body massage [1].

STUDY 3

The third study examined the Fasciatherapy-inspired *body* massage effects at the perception, physiological and neurological levels. EEG data were recorded but are not presented here, they are still under investigation.

Materials and methods

The standardized *body* massage was performed by a Fasciatherapist on 20 women aged 35 to 55 years, and covers 6 body regions (i.e, arms, neck, trapezius muscles, etc.). The effects of the massage were compared with the effects of resting periods when participants remained lying down (separated "control" visit for the questionnaire data ; pre- and post-massage resting periods for physiological measures). Effects on relaxation were investigated by using an adapted version of the Smith Relaxation States Inventory (SRSI3-2 [10]) and by measuring physiological markers of heart rate (PPG signal). The SRSI3 explores six dimensions of relaxation on physical and psychological levels (physical relaxation, drowsiness, disengagement, mindfulness, positive disposition/energy, stress, and spirituality – the latter was not retained for the present study). Emotional impact was evaluated using 11-point visual analog scales (22 emotional items, positive and negative items). Questionnaire statistical analyses were conducted by comparing pre- and post-intervention periods for *massage* vs. *control visit*. Heart rate was analyzed during the *massage visit* only, by comparing the acclimatization phase to the resting period, and by analyzing the entire massage session. Repeated-measures analysis of variance (ANOVA) was used to analyze outcomes across times. Post hoc tests of Tukey (e.g., pairwise comparisons) were undertaken when the ANOVA was significant.

Results

Analyses of the SRSI3 revealed a significant improvement in the 6 relaxation dimensions after the *body* massage, particularly for physical relaxation (p=0.0017), disengagement (p=0.04), and positive energy (p=0.0051*)* in comparison to the visit control (*pvalue of the interaction effect*). These results were corroborated by physiological measurements, showing a decrease in heart rate during the massage (p<0.0001) (Figure 8) and between the REST and ACC periods (p=0.008). Simultaneously, a significant increase in SDNN and RMSSD parameters was observed, both influenced by the parasympathetic system, indicating an increased level of relaxation. At the emotional level, ANOVA interaction revealed that women felt more positive emotions (p=0.013), they reported to feel more pleasantly surprised (p=0.001), soothed (p=0.0064) and relaxed (p=0.027), boosted (p=0.0136), serene (p=0.033) and self-confident (p=0.015) after the massage vs. the resting session.

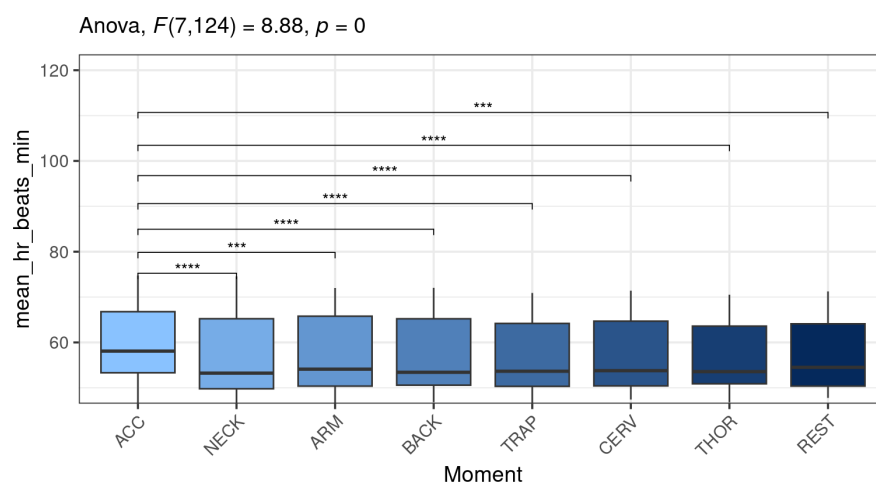**Figure 8. Mean Heart Rate** (beats/min) across time and the areas of the *body* massaged.

DISCUSSION ON STUDY 3

Combining perception measures with physiological measurements allows for the exploration of new dimensions of relaxation and opens up the emotional dimension of massage. Emotions such as "relaxed", "soothed", as well as "stimulated" and "boosted" were associated with both *body* and *face* massages in these studies. The Smith Relaxation States Inventory also enabled the exploration of several dimensions of relaxation [10], including physical relaxation, which corroborates physiological data, as well as "psychological" relaxation such as disengagement and a sense of positive energy. Massage is generally associated with stress and anxiety reduction, or enhanced relaxation state [1]. Therefore, this duality between a state of relaxation and positive stimulation deserves further investigation and will be explored through the recorded brain activity data (*analyses in progress*).

GENERAL CONCLUSION

By combining multiple scientific expertise, this research offers a comprehensive approach to the benefits of massages inspired by Fasciatherapy. By integrating women's perception measures with biological and physiological measurements, it allows the identification of underlying mechanisms related to the observed effects on appearance and well-being. These studies pave the way for exploring the little-known role of fascia on the skin and on the emotional/sensory dimension. This research provides new scientific evidence on the importance of massage and social touch for well-being and health, offering a holistic approach to "ageing well".

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