

Massage Gun vs. In-person Massage

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1. ABSTRACT

Massage guns have become an eye-catching device in recent years, for reasons of playing the supporting factor in therapy and sports. Known to equal the capabilities of deep-tissue therapy, the machine gun promotes increased flexibility; enhanced physical performance; and reduced stress. Subsequently, with the tragic arrival of the COVID-19 virus, the massage gun had become a highly popular device with those that sought physical therapy during the pandemic, as it was a device that was easy to use and abided by the social distancing protocols. However, with how limited visits to massage parlors have become, this poses questions on whether people have replaced in-person massages with hand-held massage devices as such. In pondering over this idea, our purpose for this study is to investigate whether massage guns can substitute in-person physical therapy in today's time. With ten volunteers, five women and five men were tested with 8 minutes total of hand-induced massaging and the usage of the massage gun, and were asked to rate the comfortability of each type of massage. Through our results, the female participants preferred hand-induced massages and the male participants preferred the massage guns. In deducing the p value, our null hypothesis — can massage guns be a replacement for in-person massages? — could not be refuted, therefore allowing us to conclude that in-person massages are not replaceable with affordable massage devices such as the massage gun.

2. INTRODUCTION/MOTIVATION

In a conditioned world where means of everyday technology have advanced to replace the subtle chores of human activity, the COVID-19 pandemic has prompted a greater need for the use of technological advancement in order to go about everyday life. In essence of one of the areas in common day life that have shifted to abide by the social distancing protocols, massage therapy parlors have become a victim of the pandemic's repercussions. As we know, massage therapy parlors have been the prime and staple area for attaining rehabilitation and relaxation for patients that look to enhance physical and mental health conditions. Whether it is to reduce stress or anxiety; relieve body pain in certain areas of the body; enhance immunity and well-being, either in a state of physical, mental, or emotional necessity, or perhaps all in one; massage parlors have granted their patients with beneficial touch-based massaging to sustain the body's needs. However, through the implementation of strict social distancing protocols — administered by health

organizations — it remains difficult for patients to seek the physical treatment they desire and need. Taking this challenge as a motivator, we searched for alternatives to massaging patients with respect to the social distancing protocol, and significantly found that the massage gun has prevailed as one of the prime examples of a distance-inspired massaging tool. With conducted research, critical analysis, and applicable experimentations we aim to evaluate the major differences between in-person massages and machine-induced massages. Taking further factors into account, we examine whether the usage of a massage gun is as efficient as the messages produced by physical human touch; whether they are recommendable to patients in terms of easy use and evident results; and whether they can substitute in-person massages for physical therapy. This topic is very interesting to us because we wanted to distinguish the effects of whether obtainable technology could replace what humanity has been feeding on, that being the role of touch. Especially during such a crucial point in time when the need for touch becomes overbearing yet unattainable, we wondered whether the current technological advancements that work to sustain the human body and mind function as an acceptable substitution for human touch. It is also important that we analyze these challenges and find a way for patients to seek the treatments they need through safe alternatives that obey the pandemic's safety protocols, while also managing their health in a timely manner throughout their day-to-day schedule.

In terms of usage, the massage gun has been a commonly used therapy device amongst athletes, but it is not to say that it is not meant for everyone. In fact, it is acceptable and obtainable to everyone. Known for being equivalent to deep tissue massage therapy, people that seek to relieve full body pain; enhance physical performance; or even just relax after a long day can make great use of this device. In terms of how this device will be used, it could vary amongst individuals but the foremost procedure would be to turn the device on and aim it an inch away from the skin. The device impels vibrational pulsations across the skin that work to relaxing muscles, increasing blood flow, and aiding areas of pain.

The challenge with determining whether a massage gun would be a suitable replacement for in-person massages exists within the idea that the device can't be a universal substitution for everyone, as every individual contends to different types of massages. There is a lack of scientific evidence that reveals whether hand-held treatment devices affect mental and physical

improvements within the same time scale as how an in-person massage would, example: a regular in-person massage would last approximately an hour, whereas it is recommended to use the massage gun for a maximum of 15 minutes. In this regard, the parallel between time and efficiency of the massages (massage gun vs in-person massage) don't align. It is also because hand-held massage machines are typically used by athletes that difficulties persist when determining whether every user of the device can benefit from it the same way as how an athlete would.

One of the main limitations proposed during this study, that will also be touched up on later in this report, was that our hypothesis was tested with an inexperienced therapist rather than an experienced one. Hence, our results may be subjective towards the quality of the in-person message.

In essence of this limitation, the purpose of this study focuses between inexperienced massagers performing in-person massages and usage of the machine gun. With respect to the literary sources used in this study, we hypothesized that the massage gun could substitute in-person massages. Consequently, we featured a null hypothesis that argued against massage guns substituting in-person massages.

3. RELATED WORK

Jack Martin [2] wrote an article titled 'A critical evaluation of percussion massage gun devices as a rehabilitation tool focusing on lower limb mobility: A literature review', evaluating the use of hand held massages. Martin explores 39 different research studies on massage gun devices that investigate things like range of motion, muscle activation, force output and the possibility of reducing perceived muscle soreness. It was found that handheld percussive massage devices proved to be very effective in increasing lower limb range of motion. When used after exercise, they reduced the onset of muscle soreness. However, a downside is that the device was not successful in increasing muscle activation or force output. On the other hand, in person massages do provide this benefit. Therefore in person massages have their benefits over machine massaging. Nonetheless, machine massaging does provide many of the benefits that in person massaging provides, meaning it is a very adequate replacement. As the findings of our experiment show, different people have different preferences regarding in person versus machine massages, and there is no definitive answer as to which is better. This is perhaps because different people want massages for different reasons, and use them for different purposes. For example, some people may be looking to avoid muscle soreness after exercise rather than muscle activation, in which case machine massaging would be an ideal and much more convenient means of getting a massage. On the other hand, others may want the benefits that only in person massages provide, which is why results on which method of massaging are so divided.

However, Jian Chen [1] writes an article titled 'Rhabdomyolysis After the Use of Percussion Massage Gun: A Case Report', which entails a case of Rhabdomyolysis, a severe and life threatening illness, which arose as a result of using a percussion gun. Percussion guns are very commonly used by athletes for both warming up before sports, and for recovery afterwards. A young Chinese woman, a cyclist received percussion gun treatment by her coach on numerous occasions in order to cool down and relax her muscles. She began reporting severe pain and fatigue in her thigh muscles, as well as tea colored urine. Muscle tenderness and multiple hematomas (clotted blood)

were found on her thighs, and her urine analysis showed hemoglobinuria (excretion of hemoglobin in the urine). She was diagnosed with severe rhabdomyolysis after her serum creatine kinase was reported as 'undetectably high' a sign of rhabdomyolysis. Thankfully however, after staying in the hospital and being observed and given many medicines to aid her recovery, such as maintenance of her electrolyte balance, her situation gradually improved with the decline of creatine kinase. Despite the fact that she recovered, this should act as a wakeup call to sport professionals as well as the general public, as people need to be more careful when using these percussion guns. Even though in this specific case the patient recovered, others may not be as lucky. This article and specifically this case challenges our hypothesis because it shows that there are massive implications with the use of machine massaging that can even be life threatening. However, in person massages have their implications too. Some deep tissue massages can be dangerous and can cause blood clots, [3] which is why patients with a history of blood clotting or those who use blood thinners should be wary of deep tissue massages. Therefore both methods of massaging do have their risks and implications. However with in person massaging, this is easily avoidable by making sure that the person being massaged is not an at risk patient, and by not making the deep tissue massages too obtrusive. Machine massaging, or percussion guns are fairly new, and the reason as to why they could cause such damage is still unknown, making them rather dangerous. However this is only one case, and her illness could have been caused by an interaction of things rather than solely the percussion gun.

4. EXPERIMENTAL SETUP

4.1 Research Question

Can massage guns substitute in-person massage for physical therapy?

4.2 Hypothesis

The massage gun can be a replacement for in-person massage for physical therapy.

4.3 Null hypothesis

The massage gun cannot be a replacement for in-person massage for physical therapy.

4.4 Overview

The subject is seated on a chair and the therapist stands behind him or her. The subject receives 4 minutes of each mode of massage for each side of the body- 4 minutes manual massage for the right side and 4 minutes massage gun for the left side. While receiving the massage, the subjects rate the comfort level they are feeling and document that on a Google Form ([link](#)) after they are done.

4.5 Tools and applications

1. PulseRoll Mini massage gun (180\$)
2. Google Forms (free) [link](#)

4.6 Evaluation method

The comfort rating will be reported on a scale of 1-4 with 1 being very uncomfortable/stressful and 4 being very comfortable/relaxing. We are using an even number of choices to eliminate the psychological tendency of choosing the "midpoint",

and psychologically force the subjects to make a decision on whether it was comfortable or not.

5. METHOD

5.1 Participants

The group of participants is composed of 10 people. The group is gender-balanced, meaning there are 5 female participants and 5 male participants. The reason behind this is that we are trying to make the experiment applicable to real-life situations and a reliable source for further research in the subject. The group of participants is composed of university undergraduates, mainly 18-21 years old.

5.2 Independent variable

The means of massaging the subjects (person-to-person massage or using the massage gun).

5.3 Dependent variable

The comfort rating that the subjects report.

5.4 Confounding variables

1. The amount of physical activity that the subject has engaged in within the last 24-48 hours before the experiment. We asked the participants to limit the amount of physical activity during the day before the experiment.
2. The body composition of the participants of the experiment. Some subjects might have a higher percentage of their body composed from muscle than others, which might create variances in feeling more “comfortable” as massages are meant to relax muscles. This was extremely challenging but we tried to gather subjects that might possibly have close body compositions.

5.5 Procedure

1. The subject is going to be seated.
2. The subject is going to be given a consent form that they will be massaged by another individual and a massage gun for a total of 8 minutes and they have the right to stop the procedure if they feel uncomfortable.
3. The therapist will start massaging only one side of the subject (right shoulder, right trap, and right part of the neck) using their hands for 4 minutes.
4. The subject is going to rate the level of comfort he/she is feeling after the 4 minutes on a scale of 1-4 on a piece of paper.
5. The therapist will start massaging the other side of the subject using the massage gun (left shoulder, left trap, and left part of the neck) for 4 minutes.
6. The subject rates the level of comfort he/she is feeling after the 4 minutes on a scale of 1-4 on a piece of paper.
7. The subject is then given the link to a Google Form where they will officially input their ratings.

8. The massage gun is disinfected and the therapist changes the gloves (Covid safety protocol).

5.6 Limitations

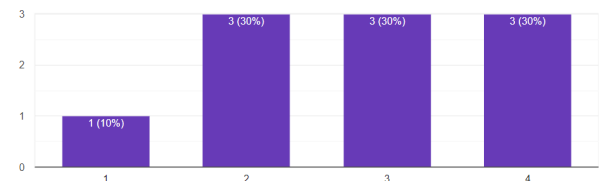
1. We have not tested our hypothesis on an adequate number of subjects as necessary to reach a definite conclusion.
2. In regards to the confounding variables, although we tried to limit them as much as possible, it is quite illogical to make assumptions that different body compositions or people with different physical activity levels will have the same experience.
3. We were limited in the sense that the therapist was not a professional one because of Covid.

5.7 Results

Subject number	In-person	Massage Gun	Gender
1	3	4	Male
2	2	3	Male
3	4	2	Male
4	3	4	Male
5	1	4	Male
6	3	2	Female
7	4	3	Female
8	2	4	Female
9	2	4	Female
10	4	3	Female

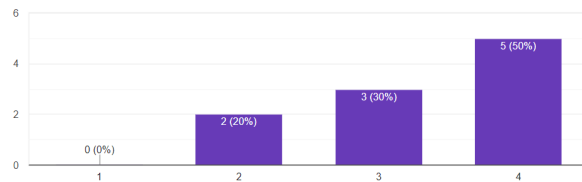
Rate your experience with the in-person massage.

10 responses



Rate your experience with the massage gun.

10 responses



Subject #1: The different speeds of the massage gun provided quick and effective recovery for my muscles, and after applying it for a short time I felt instant relief.

Subject #2: It was my first time ever to try in-person massage therapy. I felt slightly uncomfortable with getting touched constantly by another person as I am someone who appreciates personal space.

Subject #3: N/A

Subject #4: N/A

Subject #5: N/A

Subject #6: I found the in-person massage to be somewhat relaxing. However, the massage gun was extremely uncomfortable because it provided too much vibration than necessary that my skin felt irritated.

Subject #7: The traditional massage was very relaxing; it was slow and what you would expect from a massage. The massage gun also provided muscle relief, but it does not provide the relaxing part of a massage.

Subject #8: I felt slightly uncomfortable getting massaged by another person. However, I found that a massage gun on slow speed can give the same level of comfort without being in contact with another person.

Subject #9: The therapist was somewhat inexperienced that they did not succeed in making me feel comfortable.

Subject #10: N/A

5.8 Data analysis

Descriptive data analysis:

Mean:

In Person vs Massage Gun

2.8 Vs 3.3

In Person (Male) vs In Person (Female)

2.6 Vs 3

Massage Gun (Male) vs Massage Gun (Female)

3.4 Vs 3.2

In Person (Male) vs Massage Gun (Male)

2.6 Vs 3.4

In Person (Female) vs Massage Gun (Female)

3 Vs 3.2

Standard deviation:

In Person vs Massage Gun

1.032 Vs 0.823

Variance:

In Person vs Massage Gun

1.066 Vs 0.677

Inferential statistics:

Correlation coefficient:

R= -0.575

P-value:

P-value: 0.082049

5.9 Data analysis discussion

The difference between the mean of the massage gun and the in-person massage rating shows that overall the massage gun was preferred by the participants of our experiment. Thus, it can be suggested that the massage gun can be a subtle replacement for in-person massage as physical therapy. On the one hand, according to the comparison of the means of in-person (male) and in-person (female), it can be seen that females rated the in-person massage higher than males. On the other hand, males rated the massage gun higher than females, and that can be seen in the comparison of the means of massage gun (male) and massage gun (female). The previous findings hint that, generally, females preferred in-person massages while males preferred the massage gun. This can possibly be credited to males, usually, having higher muscle percentage in their body composition than females [4], because massage guns were designed to perform deep muscle tissue recovery. The results of the comparisons between the means of in-person (male) and massage gun (male), and in-person (female) and massage gun (female) can be the same as the ones discussed above. Besides, females may possibly tend to resort to in-person massages for mental relaxation and rehabilitation, which is a likely reason that females liked the massage gun less than males. The low standard deviation and the low variance of the massage gun shows that there was consensus among the participants on the rating of the massage gun. The high standard deviation and the high variance shows that opinions/ratings varied for the in-person massage, which may likely be because the therapist was not a professional and that was mentioned in our limitations. Moving to inferential statistics, the negative correlation coefficient showed that the participants displayed a tendency of choosing one mode of massage over the other, but not both simultaneously. Hence the reason that usually a high rating for either mode meant a lower rating for the other. The p value is greater than 0.05, which means that the results are not significant and that the null hypothesis cannot be rejected. Therefore, although there was a difference in the mean values of the in-person and the massage gun, the null hypothesis cannot be refuted. Hence, according to our experiment and results, massage guns cannot be a replacement to in-person massages for physical therapy. Our experiment and results are inconsistent with our hypothesis.

6. CONCLUSION AND FUTURE WORK

The massage gun used as physical treatment could be seen as an unorthodox alternative to in-person therapy for common users of the device, such as athletes and therapists. By examining the effects of a four minute in-person massage and a four minute massage using the device, the participants — composed of five men and five women — alluded to a consensus when perceiving the massage gun and a clash when perceiving the in-person

massage. We observed that female participants preferred in-person massages whereas male participants preferred using the massage guns. In analyzing our p value of more than 0.05, our study rejects the hypothesis but conforms to the null hypothesis; that massage guns cannot substitute in-person massages in physical therapy.

7. REFERENCES

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