"To give is better than to receive?":

Couples massage significantly benefits both partners' wellbeing.

Sayuri M Naruse, Piers L Cornelissen and Mark Moss

Keywords couples, emotional stress, health behaviour, massage, mental clarity, wellbeing

Journal of Health Psychology

Accepted on 13/02/2018, published on 02/04/2018

Corresponding author:

Sayuri M Naruse, Department of Psychology, Northumbria University, Newcastle upon Tyne, NE1 8ST, UK, (e-mail: s.naruse@northumbria.ac.uk).

Abstract

This experimental study evaluated the differential effects of 'giving' and 'receiving' massage on wellbeing in healthy but stressed couples. Forty-two volunteers started the study and of these, 38 (i.e. 19 couples) completed a 3-week massage course. Emotional stress and mental clarity were assessed before and after mutual massage between each pair of adults belonging to a couple at home. While massage benefitted both parties' wellbeing within a session, critically we found no differences in wellbeing between those 'giving' and 'receiving' massage. These novel findings suggest that home-based massage may be advocated to couples as a 'selves-care', health-promoting behaviour.

Introduction

Massage is a form of touch that can express care and support between givers and receivers (Pratt and Mason, 1981; Finch, 1999). Historically, massage has ancient roots in many cultures as a therapy to restore health, but also as a natural human activity to meet the human need for touch (Montagu, 1986; Culvert, 2002). Yet despite this varied potential, most research on massage has focused on its therapeutic usage, and there is a paucity of studies investigating the effects of massage among healthy adult[1] populations. Furthermore, the majority of massage studies have explored the benefits of receiving massage from a trained specialist. Studies of the effects of *giving* massage, especially by lay people, are almost unknown. The few exceptions that do exist include studies of husbands' or partners' massage of pregnant women (Latifses et al., 2005; Field et al., 2008). In one such study, Field et al. (1998) tested the effects of massage on retired people by comparing their receipt of massage from therapists with them giving massage to babies (after they had learned the massage skill). The results were interesting, and somewhat surprising. Giving massage to babies was more beneficial to these participants than them receiving massage from a

[1] There is a growing literature regarding: (a)infant massage, (b) studies of massage among children between 4-12 years and (c) parents' massaging their children.

therapist, as indexed by both short-term and longer-term measurements of anxiety, depression and salivary cortisol.

We note that, to our knowledge, there are no studies to date comparing the effects of giving and receiving massage in a reciprocal setting, such as between couples. Nevertheless, there are hints that valuable effects might be found, based on published studies of massage administered by professional therapists. For example, Jensen and colleagues (2012) found that massage therapists reported experiencing reduced anxiety after giving a massage than those who had simply rested for the same period. Airosa et al. (2016) reported that the benefit of giving tactile massage was not restricted to patients, or 'receivers', but also extended to the nursing staff, the 'givers'. Similarly, studies that have focused on home-based massage given by lay masseurs have found that the benefits of giving massage include: heightened self-efficacy (Kempson and Conley, 2009); enhanced confidence and satisfaction (Collinge et al., 2013) and the promotion of a sense of closeness (Forchuk et al., 2004). All these studies suggest giving massage benefits the giver. However, no study that we are aware of has compared the effects on such variables of what might be considered the most natural experiment of all: lay couples both giving and receiving massage to each other, evaluating the effects of 'giving' and 'receiving' massage on wellbeing. This is therefore our focus here.

We conducted the current study as part of a larger study. However, the data we report here is focused on a narrow, specific question: what effects does 'giving' and 'receiving' massage have on the wellbeing of the individuals who belong to a couple, both of whom report feeling stressed, but who are otherwise healthy. Based on the limited extant literature, our hypothesis was that giving a massage might provide health-related benefits for both the 'receiver' and the lay 'giver', and that exchanging massages might therefor be promoted as a 'health behaviour' that can benefit both parties. To this end, a massage programme was designed to provide training to couples in a simple brief sequence of massage steps (Positive Massage, PM). The participants were then encouraged to practice massage (both giving and receiving) at home, and to keep a massage log for three weeks to

track their emotional and mental wellbeing. To our knowledge, this is a novel investigation to explore possible differentiation between giving and receiving a massage amongst healthy, but stressed couples.

Participants

Participants were recruited by means of posters, flyers, email and social media (Facebook). Inclusion criteria were: (a) healthy couples where both parties are at least 18 years old; (b) both parties had to express feelings of stress, tension or worry. Exclusion criteria were: (a) known cardiovascular pathology such as an aneurysm, unless the participant had written doctor's approval to take part in the study; (b) major surgery within last three months; (c) recent injuries such as bone fractures in upper body; (d) being in the first trimester of pregnancy; and (e) already receiving massage regularly.

Forty eight participants were first asked about their availability/preference for the dates of the PM course, and then they were allocated randomly to one of the two PM intervention groups depending on their response. Please refer to the Consolidated Standards of Reporting Diagram (CONSORT; see http://www.consort-statement.org/) in Supplementary Figure 1 for further details. Group A (n=24) started the PM intervention immediately, whereas Group B (n=24) delayed the start of their PM intervention for three weeks. Four participants in group A dropped out of the study either for health reasons (n=2) or due to unexpected circumstances (n=2). Six participants in group B were unable to start the PM programme after their three week delay following initial recruitment. The reason for including the delayed treatment group was to control for duration of study effects (Raudenbush and Xiao-Feng, 2001), and to facilitate the recruitment of a reasonable sample size. A maximum of six couples could be taught in any one session to maximise the effectiveness of the training in addition to the constraints of room size and trainer availability.

Ultimately, across both groups A and B, a total of 38 participants completed the three-week massage course. Of these, 34 participants' data were used for analysis. The mean age of the participants was 37.1 years (standard deviation (SD) SD 10.63) and the mean duration of their

relationships was 8.2 years (SD 9.56). Thirty three out of 34 participants (97%) had some prior experience of receiving massage: 27/34 (79%) from professional; 13/34 (38%) from family; and 9/34 (26%) from friends. By comparison, fewer (26/34, 76%) had experience giving massage. Of these: 23/26 (88%) had given massage to the partner; 10/26 (38%) to family; 9/26 (35%) to friends; and 1/26 (4%) to colleagues. These proportions are possibly higher than the general population in the UK[2] and may reflect participants' interest in joining the study. In addition, participants sometimes failed to record the entire massage log or made obvious recording errors. In such cases the data points were ignored. This means that the final data matrix, while sparse in places, contains only the most reliable data. Further demographic details about the participants are shown in Table 1.

Table 1. Demographic Data

	Total
Number of participants started study	42
Number of participants completed study	38
Number of participants with useable data recorded	34
Mean Age	37.1(SD10.63)
Gender	
Male	15
Female	19
Mean Time length of relationship/Year	8.2 (SD 9.56)
Marital status (% within group)	
Married	16 (47%)
Cohabiting	7 (21%)
Other	11 (32%)
Ethnicity (% within group)	
White British	20 (59%)
Black or African	1 (3%)
White European	7 (21%)
Asian	1 (3%)
Other	2 (6%)
Prefer not to state	3 (9%)

[2] Although there seems to be lack of valid data such as how many people practice massage at home in general.

Materials and apparatus

Participants' emotional and mental wellbeing were assessed using a modified 8 item visual analogue scale (VAS) (Turkeltaub et al., 2014). Data were recorded by participants at home, in an online 'massage log' implemented in Qualtrics (Provo, UT). There were 3 measurement points for each of the 9 sessions throughout the PM programme: (a) before massage, i.e. baseline, (b) after the first massage, and (c) after the second massage. The 8 outcomes in the Turkeltaub et al. inventory for which VAS scores were obtained included energy, irritability, mental clarity, mood, pain, self-efficacy, emotional stress and physical uptightness. Each item in the inventory had a horizontal line scale starting at -50 (the most negative) and continuing through zero up to +50 (the most positive). This scaling system from negative to positive numbers was based on the original scoring used by Turkeltaub et al. (2014). To illustrate the use of this scoring system, in the case of emotional stress for example, participants were told that -50 should correspond to the most emotionally stressed they could imagine being, while +50 should correspond to the most emotionally relaxed they could imagine being.

Positive Massage (PM) Intervention

Positive Massage (PM)[3] is a unique fusion of Eastern and Western styles of massage. PM was devised by the first author who has 10 years of experience as a certified massage therapist and 20 years of experience as an educator. The distinctive characteristic of PM is the frequent use of massage to promote wellbeing, rather than restricting it to a therapeutic role. The massage sequence is intended to be simple, brief (15 minutes) and appropriate for those who are in a close relationship. It is easily applied and does not require clothing to be removed, nor massage oil to be applied. It is therefore ideal for frequent application in a home setting with minimal disruption to the daily routine. The massage techniques used in PM include: kneading, stroking, tapping, squeezing, chopping, stretching, static and circular compression over clothes and skin with both the

[3] Originally, a systemic simple massage style was formulated as 'Peace Massage', and delivered during 2010 - 2013 for clients at a charity that supported welfare, health and wellbeing for older people in the local community. It has been developed and refined for more effective learning and easy application, and renamed as Positive Massage in 2015.

hands (palms, thumbs, fingers and sides of hands) and the arms, using some acupressure points and trigger points. The instructor taught participants to apply different levels of pressure for different kinds of massage movements. Some required gentle pressure, but the majority moderate pressure. Similarly, the speed of the movements was mostly slow. However, massage givers were also encouraged to adapt both the pressure and the speed to the receiver's comfort and preference.

Procedure

This research project was approved by the Faculty of Health and Life Sciences Research Ethics Committee at Northumbria University.

Once participants had given informed consent and been allocated to groups A or B, they were invited to the three weekly massage classes at Northumbria University, in weeks 1 to 3 and weeks 4 to 6 of the programme respectively. The PM programme was run by the first author with the help of an assistant. It consisted in supervised classes (week 1: back massage, week 2: arm, neck and head massage, and week 3: all parts and face) and self-directed massage practice at home, to be carried out three times per week. Participants were given handouts each week, to remind them of the massage sequence for the week.

Over the course of the 3 weeks, each couple was asked to take part in nine practice sessions at home. Each session comprised: a) a set of baseline VAS measurements from *both* members of a couple before any massage took place; b) one member of a couple giving 15 minutes massage to the other, and both participants completing a second set of VAS scores; c) the couple then swapping roles with the person who was giving massage now receiving a massage and vice versa. Following the second massage, a third set of VAS scores was obtained from both participants. In this way, a full dataset for each of the 9 sessions comprised 2 baseline VAS measurements, and two sets of 'giver' and receiver' VAS measurements: one member of a couple acting first as 'giver' then 'receiver' while the other member acting as 'receiver' then 'giver'.

Treatment of Data

We investigated the impact on self-report measures of wellbeing, of adults who belong to stable couples, giving and receiving massage to and from each other. While 8 psychological outcomes were measured using the VAS, we wanted to be sure only to report outcomes that were statistically independent of each other and of potential theoretical/clinical importance. Therefore, we first examined the correlations between all 8 outcomes from the Turkeltaub et al. (2014) inventory, and used principal components analysis to identify statistically independent dimensions in the data. Based on these results, we selected emotional stress and mental clarity for further analysis using multi-level modelling.

Results

Table 2 shows the Pearson correlations between the 8 VAS scores obtained from 34 participants at the first baseline, before any massage took place.

Table 2. Pearson correlations between the eight VAS scores at first baseline measurement.

	MC	EN	SE	MD	PU	ES	PN
EN	0.58***	-	-	-	-	-	-
SE	0.59***	0.38*	-	-	-	-	-
MD	0.43**	0.49**	0.54*	-	-	-	-
PU	0.02	0.32	0.31	0.48**	-	-	-
ES	0.25	0.32	0.64***	0.52**	0.75***	-	-
PN	-0.25	-0.002	0.23	0.19	0.19	0.35*	-
IR	0.29	0.25	0.40*	0.46**	0.02	0.35*	0.32

*= p<.05; **= p<.01; *** = p<.001

NB: MC = mental clarity; EN = energy; SE = self-efficacy; MD = mood; PU = physical uptightness; ES = emotional stress; PN = pain; IR = irritability.

It is clear from Table 2 that there are a number of substantial and statistically significant correlations between outcomes. This suggests that we could not rely on the labels for the outcomes to represent meaningfully separate, statistically independent concepts. Therefore, we submitted these data to a principal components analysis to reveal how many independent, latent dimensions

there were in the data. To do this, we used PROC FACTOR in SAS v9.4 (SAS Institute, North Carolina, USA) with Varimax rotation. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (which indicates the degree of diffusion in the pattern of correlations) was 0.62 suggesting a borderline acceptable sample. Three factors had an Eigen value greater than Kaiser's criterion of one which explained 77% of the variance. The scree plot showed an inflexion, i.e. Cattel's criterion which also justified retaining three factors. The residuals varied between 0.1 and 0.04, and the overall root mean square off-diagonal residual was 0.081, indicating that the factor structure explained a large proportion of the correlations. The rotated factor loadings are shown in Table 3, and we have highlighted values greater than 0.4 for clarity. Principal component one (PC1) loaded primarily onto mental clarity, energy, self-efficacy and mood. PC2 loaded primarily onto physical uptightness and emotional stress. PC3 loaded primarily onto pain and irritability. Since emotional stress and mental clarity are both conceptually important attributes of emotional and mental wellbeing respectively, and were shown to be statistically independent of each other, we restricted further analysis of the data to these two outcomes.

Table 3. Rotated factor loadings from PCA.

	PC1	PC2	PC3
MC	***0.93***	-0.05	-0.02
EN	***0.73***	0.27	-0.03
SE	***0.63***	0.35	0.39
MD	***0.58***	***0.46***	0.33
PU	0.08	***0.96***	-0.04
ES	0.28	***0.81***	0.34
PN	-0.29	0.29	***0.79***
IR	0.40	-0.07	***0.78***

NB: MC = mental clarity; EN = energy; SE = self-efficacy; MD = mood; PU = physical uptightness; ES = emotional stress; PN = pain; IR = irritability; PCA: principal component analysis.

Multivariate analysis

We wanted to model how emotional stress and mental clarity changed with time across massage sessions, and particularly in relation to whether massage was given or received. To do this

we used PROC MIXED in SAS v9.4 to build two separate multi-level models, one for each of the two outcome measures. The initial model in each case included as fixed effects: GROUP (i.e. intervention group A and delayed intervention group B to which participants had been assigned); SESSION (i.e. which of the nine sessions were the data gathered, treated as a continuous time variable); CONDITION (i.e. (a) baseline measurement, before the first massage event, (b) whether the responder gave massage, (c) whether the responder received massage); ORDER (i.e. the order in which each member of a couple gave and received massage) and finally the two-way interaction CONDITION × SESSION. We included participants nested within their respective couples as a random effect and permitted individual variation at both the intercept level and as a function of session by specifying a heterogeneous autoregressive covariance structure. CONDITION was dummy coded, with receiving massage as the control, baseline indexed by 1, and giving massage indexed by 2. These models were optimized according to three criteria: (a) there needed to be a statistically significant difference in -2 log likelihood between the final and the empty model in each case, (b) main effects were retained if they were statistically significant at $p<.05$ and (c) produced a statistically significant reduction in -2 log likelihood by being retained. The optimized model results are illustrated in Table 4 and graphed in the first row of each of the Figures 1a and 1b. For both outcome measures it is clear that scores improved as a function of massage session, and that in general scores as a result of giving or receiving massage were improved compared to baseline. In general, for each model we found no statistically significant effects of GROUP, ORDER or the two-way interaction SESSION × CONDITION.

Table 4. Outcomes for the two multi-level models, one each for emotional stress and mental clarity. Time (i.e. session) was treated as a continuous variable to allow us control for the effect of autocorrelated covariance.

Model Parameter	**F-value (DF)**	**Z-value**	**p-value**	**Estimate**	**95% CI**	**-2Log likelihood**
Emotional Stress						
Empty model						3745.8

Full model						3587.2
Session	8.91 (1, 20.7)		.0071	1.073	0.32 – 1.82	
Condition	88.52 (2, 373)		<.0001	1: -19.97 2: -5.36	-23.03 – -16.92 -8.42 – -2.31	
Ppt cov: INT		2.63	.0043	143.91		
Ppt cov: INT × SLOPE		1.68	.046	1.91		
Ppt cov: SLOPE (AR)		-1.65	.099	-0.43		
Mental Clarity						
Empty model						3487.4
Full model						3398.7
Session	4.63 (1, 25.7)		.041	0.58	0.026 – 1.14	
Condition	44.85 (2, 375)		<.0001	1: -9.66 2: 1.93	-12.24 – 7.08 -0.66 – 4.52	
Ppt cov: INT		2.19	.014	59.68		
Ppt cov: INT × SLOPE		1.49	.068	0.84		
Ppt cov: SLOPE (AR)		0.41	.68	0.17		

Next, we wanted to compute simple effects pairwise comparisons of scores between: (a) baseline and giving, (b) baseline and receiving, and (c) giving and receiving, separately for each of the 9 sessions. To do this, we re-ran the optimized models, but this time treating session as a class variable, and allowing individual participants' intercepts to vary by specifying an unstructured covariance matrix. This allowed PROC MIXED in SAS v9.4 to test for significant differences in the predicted means (i.e. LSmeans) at each time point, while simultaneously controlling for multiple comparisons. These pairwise comparisons are illustrated in the bottom rows of Figures 1a and 1b. In each case a data point corresponds to an LSmean difference with its accompanying 95% confidence interval. If any mean difference together with its confidence interval sits either entirely above or below the black dashed zero line, then it is statistically significant at $p<.05$. If the error bars intersect the zero line, then this comparison is not statistically significant at $p<.05$. The cross-hatched bars at each time point indicate the overall number of viable data points that contributed to the computations for that time point, and are indicated by the y-axis on the right of each graph. It is very clear that the instances where there are no significant effects of giving/receiving massage relative to baseline, tend to be associated with reduced numbers of data points for that session. Most importantly, all 9 Pairwise comparisons between giving and receiving for the emotional stress

and mental clarity (i.e., the grey triangles in the lower plots for Figures 1a and 1b) were not significantly different from zero for any sessions.

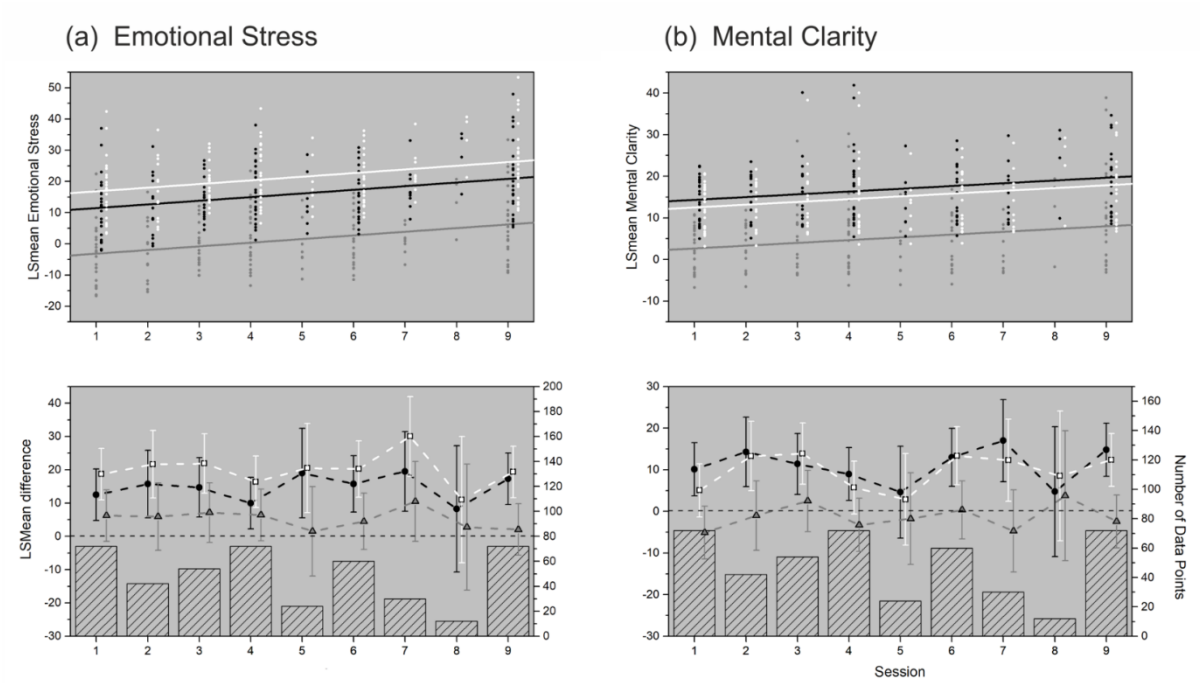


Figure 1. Emotional stress (a) and mental clarity (b), the upper row shows the relationship between fitted individual data points and massage session. In the upper row, the data are plotted separately for grey as the baseline (i.e. before massage), black as giving massage and white as receiving massage. Straight lines represent the simple regression lines in each case, the colours corresponding to the appropriate data points. The plots in the lower row show post-hoc comparisons for each session. The differences are between: baseline versus giving massage (black circles), baseline versus receiving massage (white squares), giving versus receiving massage (grey triangles). Error bars represent the 95% confidence intervals for these differences. The y-axis at the right-hand end of the lower plots represents the total number of data points that have been included into any of the pairwise comparisons (cross-hatched bars).

Finally, we sought evidence for improved response scores over the course of the 9 sessions by comparing baseline, receiving and giving, respectively in session 1 with session 9. Accordingly, the comparisons of LSmean differences in emotional stress showed statistically significant improvements for both giving (t=3.36, p=.0009) and receiving (t=2.31, p=.021), and to our surprise, also for baseline (before massage practice) (t=2.15, p=.032) as well. For mental clarity, we only found a statistically significant improvement between sessions 1 and 9 for receiving (t=2.31, p=.022). No significant reductions between sessions 1 and 9 were observed for any outcome measure.

Discussion

Lay couples were trained to administer a simple massage routine which was delivered over the course of 9 sessions, during the three week programme. Our results showed that brief periods of massage produced statistically significant reductions in emotional stress and improvements in mental clarity, compared to baseline, whether participants were givers or receivers of massage. Importantly, we also found no significant differences between giving and receiving massage on emotional stress or mental clarity at any of the study time points. Therefore, taken as a whole, our results suggest that *both* giving and receiving massage between lay couples is equally beneficial with regard to their self-reported emotional stress and mental clarity.

We consider it a particularly important finding that givers experienced emotional and mental wellbeing benefits to the same extent as that receivers did. We speculate that the effects of giving massage may be related to unique characteristics of touch; touching someone means that you can feel what it is you are touching. Giving massage inevitably involves the giver feeling the receiver's body through their fingertips and hands, which have a high density of mechanoreceptors (Johansson and Vallbo, 1979). In turn, their afferent nerve fibres will stimulate a large part of the cortical homunculus (Heller and Schiff, 1991). By giving a massage, the hands are stimulated physiologically and the giver psychologically via sensitive tactile and pressure receptors (Field, 2010). This may be linked with evidence that touch can create bonds and connections in inter-personal relationships through non-verbal interaction (Gallace and Spence, 2010; Debrot et al, 2013), and there is evidence that relationships/connectedness play an important role in establishing and maintaining a sense of wellbeing (e.g. Seligman, 2011 ; Ryan and Deci, 2000). The beneficial effects of PM reported here may therefore be, in part, a consequence of the strengthening of such bonds between couples.

Interestingly and to our surprise, we also found beneficial effects of massage that accrued over the 9 sessions of the study, particularly for emotional stress. Specifically, the pre-massage VAS measure of emotional stress, just before massage began, showed a statisticsally significant reduction in emotional stress between session 1 and session 9. This result suggests that exchanging massages

not only provides couples with benefits *within* a massage session, but also that these benfits to well-being may accumulate over time. Ideally, therefore, future studies should identify: a) how long do these effects persist for; b) what is the minimum number of massage sessions needed to observe this benefit; c) how much of an improvement in the emotional stress scale rating constitutes a clinically meaningful change.

The current study suggests that giving massage may not only support one's partner but also may contribute to one's own 'self-care'. In short, the giving and receiving of massage between couples might be thought of as 'selves-care'[4], denoting activity to simultaneously care for a loved one and oneself. Exchanging brief massages in daily life may be a positive and valuable 'selves-care' approach to the maintenance of wellbeing. The concept of 'selves-care' is important, since one's wellbeing impacts other's wellbeing reciprocally, especially within close relationships (Martire and Schulz, 2007). The current findings suggest that couples massage can be promoted as a 'health behaviour' as it possesses the quality of 'selves-care' via caring touch. We further argue that the target should not be limited to only couples but aimed at a wider population such as family and friends where non-verbal communication would be appreciated (Pratt and Mason, 1981). This suggestion is in line with McFeeters and colleagues (2016) who recommend involving family members to provide massage in the care of older people. The potential impact of promoting exchanging massages among couples and close relationships in wider population cannot be overestimated. However, motivation and willingness or even awareness of capability within oneself to be able to give massage may not be as readily apparent as the benefits of receiving.

The most important indication from the results is that home-based mutual massage such as PM can be promoted as a 'health behaviour' and can be incorporated into couples' daily life. Some of the couple-focused health related interventions considered elsewhere (e.g. physical activity) have also been found to be more effective than individual approaches (Arden-Close and McGrath, 2017; Gellert et al., 2011). It should perhaps not therefor be surprising that we can extend that list.

[4] A neologism created by the first author.

Limitations

We acknowledge that this study sample is unlikely to be representative of modern western couples in general because the participants were self-selected volunteers. Therefore, we cannot know how well the current findings might generalize to a more representative sample. The majority of participants had previous experience in receiving and (to a lesser extent) giving massage, and this experience may have had some influence on the results. For example, perhaps participants chose to take part in the study precisely because, according to their previous experience, massage had been pleasurable, and therefore these individuals could be considered as a biased sample from a pool of positive responders. Were it ethically possible to impose massage on a truly random sample of participants, the outcomes may have been, at the very least, considerably more variable. Moreover, assessing the specificity of our findings is difficult, in part because it is hard to imagine what an appropriate placebo treatment might be. Future studies could help in this regard by: (a) using larger sample sizes; (b) including measures to minimize data loss; (c) including outcome measurements where there are no prior reasons to suppose that massage should have an influence, and then confirming this to be the case.

A second caveat concerns the degree of confidence that we can claim regarding the specificity of the 'giving' effect that we found. In the current study design the interaction between couples was reciprocal. Therefore, even though wellbeing measurements were taken from the giver just after the first massage, each giver knew that they were about to receive massage. So, it is possible that the apparent benefit to the giver, may in fact have been about their expectations of what they were about to receive. Expectancy effects have been demonstrated in other domains (e.g. Ross and Olson, 1981) and if beneficial could nevertheless form part of a successful massage intervention.

Conclusion

To our knowledge, this is the first study to demonstrate that amongst healthy adult couples who experience limited training, *both* 'giving' and 'receiving' brief massages produce positive benefits in emotional and mental wellbeing. Since massage can be a pleasant intervention that may be easily incorporated into a couple's daily life, this pioneering study therefore provides impetus for further research on home-based massage as part of a couple's 'selves-care' for emotional and mental wellbeing.

Suggestions for further study

Suggestions for further studies include:

- Using larger sample sizes, including measures to minimize data loss;
- Evaluating the feasibility and efficacy of giving and receiving brief massage in other populations such as close relationships (e.g. friends, family, and carers);
- A protracted exploration to test the impact of 'giving' and 'receiving' massage on physical and psychological wellbeing, and interpersonal relationship over months and years;
- The collection of qualitative data to understand more deeply the idiographic psychological and interpersonal effects of exchanging brief massages between close relationships;
- Exploration of the motivations and barriers for the continual practice of massage between couples and wider population;
- Including outcome measurements where there are no prior reasons to suppose that massage should have an influence, and then confirming this to be the case.

The Authors declare that there is no conflict of interest.

Reference

Airosa F, Falkenberg T, Öhlén G, et al. (2016) Tactile Massage as Part of the Caring Act. *Journal of Holistic Nursing,* 34(1): 13-23.

Arden-Close E and McGrath N (2017) Health behaviour change interventions for couples: A systematic review. *British Journal of Health Psychology* 22(2): 215.

Collinge W, Kahn J, & Walton, T. (2013) Touch, Caring, and Cancer:randomized controlled trial of a multimedia caregiver education program. *Support Care Cancer* 21(5):1405-1414.

Culvert RN (2002) *The History of Massage: An Illustrated Survey from Around the World.* Healing Vermont, USA: Arts Press.

Debrot A, Schoebi D, Perrez M, et al. (2013). Touch as an interpersonal emotion regulation process in couples' daily lives: The mediating role of psychological intimacy. *Personality and Social Psychology Bulletin* 39(10): 1373-1385.

Field TM, Hernandez-Reif M, Quintino O, et al. (1998) Elder retired volunteers benefit from giving massage therapy to infants. *Journal of Applied Gerontology* 17(2): 229-239.

Field T, Figueiredo B, Hernandez-Reif M, et al. (2008) Massage therapy reduces pain in pregnant women, alleviates prenatal depression in both parents and improves their relationships. *Journal of bodywork and movement therapies*12(2): 146-150.

Field T (2010) Touch for socio-emotional and physical well-being: A review. *Developmental Review* 30(4): 367-383.

Finch MA (1999) *Care through touch: massage as the art of anointing*. Bloomsbury Publishing USA.

Forchuk, C, Baruth P, Prendergast M, et al.(2004) Postoperative arm massage: a support for women with lymph node dissection. *Cancer nursing* 27(1): 25-33.

Gallace A and Spence C (2010) The science of interpersonal touch: an overview. Neuroscience & Biobehavioral Reviews 34(2): 246-259.

Gellert P, Ziegelmann J, Warner LM, et al. (2011) Physical activity intervention in older adults: Does a participating partner make a difference? *European Journal of Ageing* 8: 211–219.

Heller MA and Schiff W (1991) Conclusions: The future of touch. *The psychology of touch:* 327-337.

Jensen AM, Ramasamy A, Hotek J. et al. (2012) The benefits of giving a massage on the mental state of massage therapists: A randomized, controlled trial. *The Journal of Alternative and Complementary Medicine* 18(12): 1142-1146.

Johansson RS and Vallbo ÅB (1979) Tactile sensibility in the human hand: relative and absolute densities of four types of mechanoreceptive units in glabrous skin. *The Journal of physiology* 286(1):283-300.

Kempson D and Conley V(2009) Family caregiver provided massage for rural- dwelling chronically ill persons. *Home Health Care Management and Practice* 21(2): 117-123.

Latifses V, Bendell Estroff D, Field T, et al. (2005) Fathers massaging and relaxing their pregnant wives lowered anxiety and facilitated marital adjustment. *Journal of Bodywork and Movement Therapies* 9: 277–282.

Martire LM and Schulz R (2007) Involving family in psychosocial interventions for chronic illness. *Current Directions in Psychological Science* 16 : 90–94.

Mcfeeters S, Pront L, Cuthbertson L and King L (2016) Massage, a complementary therapy effectively promoting the health and well-being of older people in residential care settings: a review of the literature. *International Journal of Older People Nursing* 11:266–283.

Montagu A (1986). *Touching: The human significance of the skin.* 3rd Ed. New York: Harper & Row.

Pratt JW and Mason A (1981) *The caring touch***.** London: Heyden.

Raudenbush SW and Xiao-Feng L (2001) Effects of study duration, frequency of observation, and sample size on power in studies of group differences in polynomial change. *Psychological methods* 6(4): 387.

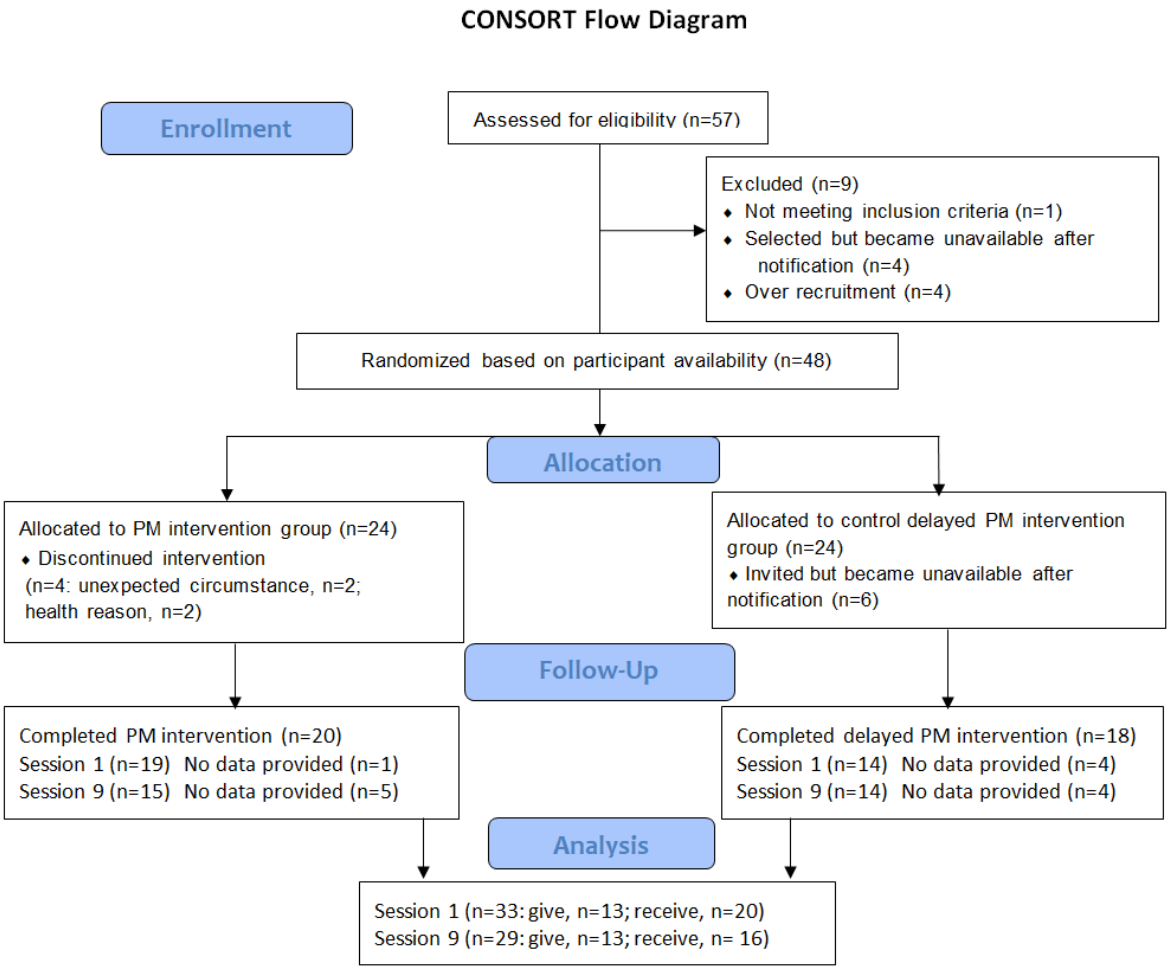
Ross M and Olson JM (1981). An expectancy-attribution model of the effects of placebos. *Psychological Review*, 88(5): 408-437.

Ryan, RM and Deci EL (2000) 'Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being', *American Psychologist* 55(1): 68–78.

Seligman MEP (2011). Flourish: A visionary new understanding of happiness and well-being. New York, NY: Free Press

Turkeltaub PC, Yearwood EL and Friedmann E (2014) Effect of a brief seated massage on nursing student attitudes toward touch for comfort care. *Journal of Alternative and Complementary Medicine 20*(10): 792-799.

Supplementary File



Supplementary Figure 1. CONSORT Flow Chart.