An Examination of the Association of Subjects' Exposure to Contact Healing Treatments to Selected Physiological Outcomes: A Pre-test/Post-test Study Design

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Abstract

The research team utilized a pre-test/post-test study design to examine the relationship between the giving of contact healing treatments (independent variables) and a select number of physiological outcomes (dependent variables). A total of 70 subjects in Abuja, Nigeria, participated in the study and received contact treatments. The dependent variables (pre-test and post-test) included diastolic and systolic pressures, pulse rate, and self-assessed subjective levels of pain. There was a statistically significant treatment effect in heart rate, which decreased an average of 4.8 beats/minute, $t(34) = -3.47$, $p = 0.00072$. There was a statistically significant treatment effect in pulse pressure, which decreased an average of 8.3 mm Hg, $t(33) = -3.75$, $p = 0.00034$. There was also a statistically significant treatment decrease in pain level by an average of 2.5 points (as measured by a 0 to 10 Likert scale), $t(33) = -7.03$, $p < 0.000000024$. Multiple linear regressions were performed with post heart rate, pulse pressure (the difference between systolic and diastolic pressure), and self-reported pain level as the outcomes (dependent variables). Only the pre-test measures corresponding to the selected post-test measures (e.g., pre self-reported pain level when the post self-reported pain level was the outcome) were, as expected, statistically significant ($p < 0.001$ throughout). The research team recommends that follow-up studies be performed that incorporate an appropriate design with control groups.

Un examen de l'exposition de patients aux traitements de guérison par contact à des résultats physiologiques choisis : une conception d'étude pré-test/post-test

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Résumé

L'équipe de recherche a utilisé une conception d'étude pré-test/post-test pour examiner la relation entre l'octroi de traitements de guérison par contact (variables indépendantes) et un certain nombre de résultats physiologiques (variables dépendantes). Au total, 70 personnes ont participé à cette étude à Abuja, au Nigéria, où ils ont reçu des traitements par contact. Les variables dépendantes (pré-test et post-test) comprenaient les tensions diastoliques et systoliques, la mesure du pouls, et les niveaux de douleur, ces derniers subjectifs et auto-évalués.

Il y a eu un effet, statistiquement significatif, de différence de fréquence cardiaque, qui a diminué une moyenne de 4.8 battements/minute, t(34) - -3.47, p - 0.00072. Il y a eu également un effet de variation, statistiquement significative, du pouls, qui a diminué une moyenne de 8.3 mm Hg,

t(33) --3.75, p 0.00034. Il y a eu également une diminution, statistiquement significative, du niveau de douleur de 2,5 points (mesurée de 0 à 10, échelle Likert), t(33) - -7,03, p 0,000000024. Des régressions linéaires multiples ont été effectuées avec la fréquence cardiaque postérieure, la pression du pouls (la différence entre la pression systolique et diastolique), et le niveau de douleur auto-déclaré comme résultats (variables dépendantes). Seules les mesures pré-test correspondant aux mesures post-test sélectionnées (p. ex., niveau de douleur pré-déclaré e et auto-déclaré lorsque le niveau de douleur post-déclaré était le résultat) étaient, comme prévu, statistiquement significatives (p - 0,001 tout au long). L'équipe de recherche recommande que des études de suivi avec les groupes témoins, qui intègrent une conception appropriée, soient effectuées.

Un examen de la Asociación de Sujetos Expuestos a Tratamientos de Curación por Contacto a Resultados Fisiológicos Seleccionados: Un Diseño de Estudio Previo al Examen/ Posterior al Examen

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Resumen

El equipo de investigación utilizó un diseño de estudio previo al examen / posterior al examen para estudiar la relación entre la administración de tratamientos de curación por contacto (variables independientes) y un número selecto de resultados fisiológicos (variables dependientes). Un total de 70 sujetos en Abuja, Nigeria, participaron en el estudio y recibieron tratamientos de contacto. Las variables dependientes (antes y después del examen) incluyeron presiones diastólicas y sistólicas, frecuencia del pulso y niveles subjetivos de dolor autoevaluados. Hubo un efecto del tratamiento estadísticamente significativo en la frecuencia cardíaca, que disminuyó un promedio de 4.8 latidos / minuto, t (34) = -3.47, p = 0.00072. Hubo un efecto del tratamiento estadísticamente significativo en la presión del pulso, que disminuyó un promedio de 8,3 mm Hg, t (33) = -3,75, p = 0,00034. También hubo una disminución estadísticamente significativa del tratamiento en el nivel de dolor en un promedio de 2.5 puntos (medido por una escala Likert de 0 a 10), t (33) = -7.03, p <0.000000024. Se realizaron regresiones lineales múltiples con frecuencia cardíaca posterior, presión de pulso (la diferencia entre la presión sistólica y diastólica) y el nivel de dolor autoinformado como los resultados (variables dependientes). Solo las medidas previas al examen correspondientes a las medidas seleccionadas posteriores al examen (Por ejemplo, el nivel de dolor informado previamente cuando el nivel de dolor posterior a la autoinformación fue el resultado) fueron, como se esperaba, estadísticamente significativas (p <0,001). El equipo de investigación recomienda que se realicen estudios de seguimiento que incorporen un diseño apropiado con grupos de control.

Um Exame da Exposição da Associação de Indivíduos a Tratamentos de Cura por Contato com Resultados Fisiológicos Selecionados: Um Projeto de Estudo Pré-teste / Pós-teste

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Sumário

A equipe de pesquisa utilizou um esquema de estudo pré-teste / pós-teste para examinar a relação entre a administração de tratamentos de cura por contato (variáveis independentes) e um número seleto de resultados fisiológicos (variáveis dependentes). 70 indivíduos em Abuja, na Nigéria, participaram do estudo e receberam tratamentos de contato. As variáveis dependentes (pré-teste e pós-teste) incluíram pressões arteriais diastólicas e sistólicas, freqüência cardíaca e níveis subjetivos de dor auto-avaliados. Houve um efeito de tratamento estatisticamente significativo na frequência cardíaca, que diminuiu uma média de 4,8 batimentos/minuto, t (34) = -3,47, p = 0,00072. Houve um efeito de tratamento estatisticamente significativo na pressão de pulso, que diminuiu uma média de 8,3 mm Hg, t (33) = -3,75, p = 0,00034. Houve também uma redução estatisticamente significante do tratamento no nível de dor em uma média de 2,5 pontos (medido em uma escala Likert de 0 a 10), t (33) = -7,03, p <0,000000024. Regressões lineares múltiplas foram realizadas com pós frequência cardíaca, pressão de pulso (a diferença entre pressão sistólica e diastólica) e nível de dor auto-relatado como resultados (variáveis dependentes). Apenas as medidas pré-teste correspondentes às medidas selecionadas pós-teste (por exemplo, nível de dor pré-relatado, quando o nível de dor pós-relatado foi o resultado) foram, como esperado, estatisticamente significantes (p <0,001). A equipe de pesquisa recomenda que sejam realizados estudos de acompanhamento que incorporem um esquema apropriado com grupos de controle.

Eine Untersuchung bezüglich der Verbindung zwischen einer ausgeführten Kontakt Heilung Behandlung und deren selektiven physiologische Ergebnisse: ein Versuchsprojekt für Vor- und Nachuntersuchungen

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Zusammenfassung

Das Forschungsteam benutzte Tests, die versuchsmäßig vor und nach der Behandlung ausgeführt wurden, um den Zusammenhang zwischen Kontakt Heilung Behandlungen (unabhängige Variablen) und einer fest definierten Anzahl physiologischer Ergebnisse (abhängige Variablen) zu studieren. Insgesamt 70 Probanden aus Abuja, Nigeria nahmen Teil an der Untersuchung und bekamen Kontakt Behandlungen. Zu den abhängigen Variablen (Vor- und Nachuntersuchungstests) zählte diastolischer und systolischer Druck, Pulsmessung, und Selbstbewertung der subjektiven Schmerzgrenze. Im Herzbereich war das Resultat der

Behandlung statistisch signifikant: es ergab durchschnittlich eine Abnahme der Herzschläge um 4.8 Schläge/Min., $t(34) = -3.47$, $p = 0.00072$. Auch beim Puls ergab die Behandlung ein statistisch signifikantes Resultat, wobei dieser durchschnittlich um 8.3 mm Hg senkte, $t(33) = -3.75$, $p = 0.00034$. Darüber hinaus stellte man hier auch eine statistisch signifikante Minderung der Schmerzgrenze um durchschnittlich 2,5 Punkte (gemessen auf der 0-10 Likert Skala) fest, $t(33) = -7.03$, $p < 0.000000024$. Es wurden multiple lineare Regressionen mit den Herzfrequenzen, dem Puls (Unterschied zwischen diastolischem und systolischem Druck), und der daraus resultierende selbst angegebenen Schmerzgrenze (abhängige Variable), die also nach der Behandlung gemessen wurden, durchgeführt. Nur die Tests, die vor der Behandlung gemacht wurden und die korrespondierten mit den Tests, die nach der Behandlung gemacht wurden (z.B. die vor der Behandlung selbst bewertete Schmerzgrenze wenn die selbst bewertete Schmerzgrenze nach der Behandlung daraus resultierte) waren erwartungsgemäß statistisch signifikant ($p < 0.001$ durchgehend). Das Forschungsteam empfiehlt Folgeuntersuchungen bei einer Kontrollgruppe wobei geeignete Tests miteinbezogen werden sollten.

Introduction

This research is informed by a study published in 2014 that examined "the roles and effects of the contact healing and vowel sound intonations on physiological functions."[1] Additional, earlier research on heart rate variability in association with deep breathing also contributed to this present research.[2] This study also builds on preliminary research that was featured in the "Mindquest" collection of articles published by the Rosicrucian Order, Ancient Mystical Order Rosae Crucis (hereafter referred to as AMORC). Noteworthy is the fact that earlier research did not support a statistically significant association between contact healing treatments and observed decreases in self-reported levels of pain as well as other measurable physiological responses. The study did however find that a higher pulse rate was statistically and significantly associated with positive breathing. This finding is consistent with other findings previously reported by non-AMORC and AMORC research studies. A number of results were found not to be statistically significant that may have been a function of the small sample size employed in the study. For example, the study did not detect differences between positive breathing and negative breathing when contrasted with regular breathing. This present research study is an attempt to further examine aspects of previous findings, this time with the benefit of a larger sample size. It is hoped that the findings will guide the design and planning of subsequent research. The principal research question explored was whether or not there was a statistically significant association (e.g., perhaps predictive relationship based on multiple regression coefficients) between contact treatments presented in AMORC teachings and changes in select physiological outcomes mediated through the autonomic nervous system.

Methods

Study Design

The study utilized a Pre-test/Post-test design. There were no control groups. *A priori* sample size calculations were made using corresponding means and standard deviations of differences from a previous article.[3] The calculations were for dependent (matched) sample t-tests. The tests were one-tailed to examine changes in one direction (i.e., improvement in health). Based on a previous

study,[4] heart rate and pulse pressure were identified and selected as relevant, and were readily measurable dependent variables. For heart rate, statistical significance level $\alpha = 0.05$ and power 1- β=0.80, total sample size was n=8. Even with the stricter conditions of $\alpha = 0.01$ and power 1- β=0.90, the total sample size was still small at n=16. For self-reported pain level, $\alpha = 0.05$ and 1- β=0.80, total sample size was n=5. With $\alpha = 0.01$ and 1- β=0.90, the total sample size was n=10. For pulse pressure, $\alpha = 0.05$ and 1- β=0.80, total sample size was n=93. With $\alpha = 0.01$ and 1- β=0.90, the total sample size was n=195. *A priori* sample size calculations were also made to accommodate the likely use of multiple regression methods to analyze the data. The tests were two-tailed because for some of the predictors change in the outcome might plausibly be an increase or decrease. For multiple linear regressions of the outcome variables with 10 predictors, $\alpha = 0.05$ and 1- β=0.80, the total sample size was n=55. With $\alpha = 0.01$ and 1- β=0.90, the total sample size was n=103. Based on a previous study, the required sample size for dependent samples t-tests could be small at n=16 for heart rate and self-reported pain. However, for the multiple linear regressions and particularly for paired sample t-tests for pulse pressure, a larger sample size of at least n=93 (for, $\alpha = 0.05$ and 1- β=0.80) was desirable, or at least the goal was to expand the study size as much as feasible toward that size.

The Intervention

A total of 70 members were self-enrolled subjects at Centrum Lodge, Abuja. Of these 12 (8 male and 4 female) volunteered to be treatment givers as well. Ten treatment stations were set up in a large hall which included two chairs lined up, one in front of the other, one for the treatment giver and the other for the subject. The treatment recipient, clothed throughout the treatment, sat and rested on the back rest of a chair so that the dorsal area of the back was unencumbered and available for contact treatment. The treatment giver was seated on a chair behind the treatment recipient. It is from this configuration that contact treatment was rendered.

The study coordinator instructed each participant to indicate the nature of ailment(s) for which they sought contact treatment. Based on the information provided by a subject, in line with the recommendations of AMORC teachings, a determination was made that one of three treatments would be given: positive treatment only, negative treatment only, and combined positive and negative treatment. Positive treatment is contact healing given during the state when the treatment giver has inhaled deeply and held her breadth. With negative treatment, the treatment giver has exhaled and held her breadth whilst giving contact treatment.

The contact treatment involved the placement of fingers by the treatment giver along a proximal spinal area of the back. The location of the treatment was dependent upon the requirements of the ailment and the handedness of the treatment giver. Treatments were applied to the subjects' backs through their clothing.

Ten stations of treatment were spread out in a comfortably large room with dimmed lights. Treatment was delivered with the subject in a seated position. The duration of each treatment session ranged from five to ten minutes. It was the treatment givers' decision whether to sit or to stand in the course of providing contact treatments. Four volunteers recorded measurements of predesigned measurement charts and were each given a thirty-minute-long training. The lead researcher regularly supervised data recordings. Some treatment givers also requested to receive treatment. When a treatment giver also elected to receive contact treatment, such crossover was noted and is duly recorded in the dataset, so that this can be accounted for in the analysis. The

entire study period spanned four hours. After the sessions concluded, an open forum on health-related topics was provided for the participants.

Data Collection

Prior to contact healing treatment, data was collected from each subject. Data collected included the subject's height, weight, age, pulse rate, diastolic and systolic blood pressure, sex, and number of years as a member of the Order. Participants were also asked to self-rate the state of pain experienced at the time of the study using a ranking scale of 0-10 on a Likert Scale; zero for no pain to 10 which was severe.[5] Immediately after the contact treatment was given, the pulse rate, diastolic and systolic blood pressures of participants were taken while still seated. After treatment, subjects were also asked to once again provide a rating of their pain using the same 0-10 Likert scale and recorded for each subject.[6] All the data provided was entered in an Excel spreadsheet.

Blood pressure readings, diastolic and systolic measurements, as well as heart rates were obtained with a battery-operated blood pressure device. With one participant, the cuff was not large enough to take baseline readings and was excluded from the study. Height was measured with a height meter set up on a wall with subjects standing barefoot with their backs to the wall. Participants were weighed clothed on a simple digital scale.

Human Subjects, Ethical and Confidentiality Considerations

Approval for the study was obtained prior to its inception from the administrative leaders of the Rosicrucian Order, AMORC. The objectives of the study were verbally explained to all participants with a clear understanding of their right not to participate in any or all aspects of the study. In addition, a written description of the study was provided and participants were able to include their names and contact details as an indication of informed consent. All participants gave written, informed consent prior to participation.

Subjects' Inclusion and Exclusion Criteria

The participants included were limited to members of the Rosicrucian Order, AMORC. The other inclusion criterion was that it was possible to manually obtain baseline and follow up blood pressure measurements. No exclusion criteria were applied on any volunteers that consented to participate in the study. Although some subjects did not have a completed data set, they were included for what data was available.

Study Outcomes Measured

The study measured three primary outcome variables. Those measurements compared pre-treatment data with data taken after treatment. The first variable change tracked pulse pressure (systolic pressure minus diastolic pressure). The second variable change tracked was heart rate. The third was the change in self-reported pain levels assessed by the subject. The variables employed in the study are shown in Table 1.

Table 1. Study Variables Definition

	Variable Name	Variable Definition
1	IDNO	Unique identification number for Subject
2	AGE	Age of Subject as of last birthday; 99=missing data
3	SEX	Sex of subject; 1=Female, 2=Male, 9=missing
4	TRTRCVER	Status of subject on whether or not treatment was received; 0=did not get treatment; 1=got treatment, 9=missing
5	TRTMNT	Type of Treatment received by the subject; 0=none given, 1=positive treatment only given, 2=negative treatment only given, 3=positive and negative treatment given in combination, 9=missing
6	TGIVER	Provider of treatment; 0=not treatment giver, 1=treatment giver, 9=missing
7	BPSYS1	Systolic pressure in mm Hg of subject before treatment; 8=missing, 9=not measured
8	BPDIA1	Diastolic pressure in mm Hg of subject before treatment; 8=missing, 9=not measured
9	HRATE1	Heart rate in beats per minute of subject before treatment; 8=missing, 9=not measured
10	WEIGHTKG	Weight of subject, clothed, in kilograms; 9=missing
11	HEITINCH	Height of subject in inches; 9=missing
12	YEARSRCM	Number of years (completed) a subject has been a member of the Rosicrucian Order, AMORC; 99=missing
13	BPSYS2	Systolic pressure in mm Hg of subject after treatment; 8=missing, 9=not measured
14	BPDIA2	Diastolic pressure in mm Hg of subject after treatment; 8=missing, 9=not measured
15	HRATE2	Heart rate in beats per minute of subject after treatment; 9=missing
16	PAINRATE1	Subject self-rated pain level before treatment based on a 0 to 10 scale; 0=no pain and 10=severe pain; 88=missing, 99=not measured
17	PAINRATE2	Subject self-rated pain level after treatment based on a 0 to 10 scale; 0=no pain and 10=severe pain; 88=missing, 99=not measured
18	WEIGHTLB	Weight of subject in pounds generated from weight in Kilograms; 9=missing
19	BMI703	Weight of subject multiplied by 703, an intermediate value towards calculation of Body Mass Index (BMI)
20	HTSQINCH	Square of subject's height in inches squared
21	BMI	Computed Body Mass Index of subject equal to BMI703 divided by HTSQINCH

Results

Complete (non-missing) data on the matched pre/post pairs were available for n=34 to 35 of the participants depending on the outcome variable (e.g., heart rate). Paired sample t-tests were performed for the pre to post treatment changes in heart rate, pulse pressure and self-reported pain level. The statistical tests were performed as one-tailed statistical tests because of *a priori*

hypothesized decreases in the health outcomes (e.g., self-reported pain level). These decreases in the outcomes after treatment can be viewed as being not only statistically significant, but also clinically significant and desirable changes in health.

One-tailed post-hoc statistical power analyses were conducted with results reported later below. A commonly used guideline for statistical power[7] is $1 - \beta = 0.80$. The achieved power estimates given below are generally well above 0.80, so they seem satisfactory. There was a statistically significant treatment effect in heart rate decreasing on average 4.8 beats/minute, $t(34) = -3.47$, $p = 0.00072$. The post-hoc power analysis with statistical significance level $\alpha = 0.05$ gave an achieved power $1-\beta=0.96$, and for $\alpha = 0.01$ there was an achieved power $1-\beta=0.84$.

There was a statistically significant treatment effect in pulse pressure decreasing on average 8.3 mm Hg, $t(33) =-3.75$, $p = 0.00034$. (Pulse pressure is equal to Systolic Pressure minus Diastolic Pressure.) Almost all the decreases were desirable in i) keeping pulse pressure at or above 40 mm Hg and ii) keeping pulse pressure below 60 mm Hg or moving toward that level.[8] The post-*hoc* power analysis with statistical significance level $\alpha = 0.05$ gave power $1-\beta=0.98$, and for $\alpha = 0.01$ power $1-\beta=0.90$.

There was also a statistically significant treatment effect in pain level decreasing on average 2.5 points (on the 0 to 10 scale), $t(33) = -7.03$, $p < 0.000000024$. The *post-hoc* power analysis with statistical significance level $\alpha = 0.05$ gave power $1-\beta=1.00$, and for $\alpha = 0.01$ power $1-\beta=1.00$. This result is similar to the findings obtained in our earlier study.

Multiple linear regressions were performed with post heart rate, pulse pressure and self-reported pain level as the outcomes (dependent variables). Explanatory (independent variables, predictors) were age, sex, BMI, BMI squared, treatment giver, years a member of AMORC, pre-heart rate, post-heart rate (if not the outcome), pre-pulse pressure, post-pulse pressure (if not the outcome), and pre self-reported health, and post self-reported health (if not the outcome). The quadratic term BMI squared was included in order to take account of possible curvature in BMI. This approach is advisable because BMI has a mid-range that can be optimal for health (whereas both low and high BMI values can be less healthy). The sample size was $n=30$ for complete cases on the variables involved in the set of regressions for each of the three outcome variables. Only the pre-measures corresponding to the selected outcome post measure (e.g., pre self-reported pain level when the post self-reported pain level was the outcome) were, as expected, statistically significant ($p < 0.001$ throughout) and had positive coefficients. The other explanatory variables were not statistically significant even when the least significant explanatory variables were successively removed. The final regression models are reported in Table 2. The post-hoc power analyses with statistical significance level $\alpha = 0.05$ gave power $1-\beta$ much lower than 0.80 (e.g., values around 0.32) which is not surprising given the small sample size as anticipated by our original required sample size calculation. In other words, the small sample size made it hard to detect if there were any significant explanatory variables or deemed small effects in the multiple linear regressions.

Table 2. Linear Regression Final Results, sample size *n*=30

Outcome (Post Value)	Predictor (Pre Value) or Intercept	*B* unstandardized coefficient	*t(28)* test statistic	*p* probability of null hypothesis H_0:B=0	R^2 correlation squared: proportion of variance explained	*F*(1,28) test statistic	*p* probability of null hypothesis H_0:B=0 for predictors only
Pain Level	Pain Rate	0.314	3.998	0.000	0.603	15.987	0.000
Pain Level	Intercept	-0.091	-0.273	0.787			
Heart Rate	Heart Rate	0.645	7.278	0.000	0.809	52.975	0.000
Heart Rate	Intercept	21.331	3.076	0.005			
Pulse Pressure	Pulse Pressure	0.551	4.999	0.000	0.687	24.985	0.000
Pulse Pressure	Intercept	20.397	2.772	0.010			

Please note: For the simple linear regression (one predictor only) results reported in the above table, the *t* and *F* tests are equivalent and thereby result in the same *p* values.

Discussion

This study had similar results to a previous and closely related study conducted by the research team on self-reported pain level and heart rate.[9] Notably, whereas pulse pressure was not statistically significant in the previous study (at the $\alpha = 0.05$ level), it was statistically significant in this study, quite likely the result of a somewhat larger sample size and increased power. The emergence of statistical significance of pulse pressure offers more credence to its plausible statistical association with contact treatments that are not explainable by overt physiological responses. The inclusion of other intervening variables such as BMI and their lack of statistical significance also do not suggest any mediating role in the observed statistically significant associations.

Although not the primary focus of this study, the 74% prevalence of hypertension[10] in the group is higher than recently published prevalence estimates of hypertension in Nigerian populations.[11] The study population is not necessarily representative of the adult general population. The population while mixed, was predominantly male. The findings are more reflective of men and to a lesser extent of women (as the prevalence of hypertension in women in the study sample was 100 percent pre and 75 percent post[12] though based on only four female participants) and was higher than that of women in the general population. Using standard BMI cut-off measures for overweight and obesity,[13] it was found that 36.5 percent of the men and 33 percent of women were overweight. A quarter of men and 44 percent of women (out of nine) were obese. The prevalence rate of being overweight were within the range of those published from a recent systematic review of obesity studies in Nigeria. Compared to other published studies, the

prevalence rate of obesity in this study was slightly higher for men and much higher for women.[14,15]

Study Limitations

The subjects were self-selected which likely introduced bias into the study. Given that the study spanned more than four hours and given the diurnal influences on blood pressure and heart rate measures, this variation was not controlled for. The measures of pain were subjective and may not consistently and accurately reflect true measurements. There were two treatment givers. Although all were trained in the same technique of treatment giving, it is likely that each treatment giver may have introduced their own effect that could have confounded the outcomes. To minimize this effect, the effect of treatment giver was controlled for in the multiple linear regression analysis, and it was not found to be statistically significant. It is not certain that the independent effect of treatment givers was fully accounted for. There was a total of 35 to 36 (depending on the outcome variable) subjects that did not complete the second round of measurements, post treatment. It is possible that these subjects were uniquely different from those that completed the results. The subjects were all members of the Rosicrucian Order and may not be representative of the general population. The study did not collect sociodemographic data such as work and level of education. Data were not collected about subjects' medication history. Interactions between subjects' medicines with the intervention cannot be ruled out. Consequently, the findings have not controlled for the effects of these variables on the outcomes measured.

The study is of a pre-test/post-test design rather than a randomized clinical trial with a control. The latter design would present various definite challenges to implement for contact treatments. The employed design suggests statistical associations only and may not prove causality.

Conclusion

This study reinforced and confirmed a statistically significant association between contact healing treatments and observed physiological response outcomes beyond the effects of chance. We recommend further research with study designs that include controls.

Conflict of Interest

The authors declare no conflict of interest.

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Endnotes

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[6] *Ibid*.
[7] The power of a statistical test is closely related to Type II error. Type II error occurs when the null hypothesis is accepted when the alternative hypothesis is true. For example, a common alternative hypothesis for this study is that the difference (change) in the post measurement would be a decrease. Power is 1 minus the probability (β) of a Type II error.
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[10] 26 out of the 35 participants that had both pre and post measurements were in the hypertension ranges. Mayo Clinic Staff, “Blood pressure chart: What your reading means,” *Mayo Clinic*, accessed May 17, 2019. https://www.mayoclinic.org/diseases-conditions/high-blood-pressure/in-depth/blood-pressure/art-20050982.
[11] Akinlua *et al.* in a 2015 systematic review reported a crude prevalence rate of hypertension in Nigerian adults ranged from between 2.1% (95%CI: 1.4 to 2.8) to 47.2% (95%CI: 43.6 to 50.8) in adults. Among men, the crude prevalence ranged from 6.2% (95%CI: 4.0 to 8.4) to 48.9% (95%CI: 42.3 to 55.5) and 10% (95%CI: 8.1 to 12) to 47.3% (95%CI: 43 to 51.6%) for women.

[12] Of the four women who had both pre and post measurements, all four had pre-measurements in the hypertension ranges, and three for the post measurements.
[13] U.S. Centers for Disease Control, "Defining Adult Overweight and Obesity," accessed February 5, 2020, https://www.cdc.gov/obesity/adult/defining.html. A BMI of 25.0 to <30 was within the overweight range. A 30.0 or higher was classified as within the obese range.
[14]I.I Chukwuonye, A. Chuku, C. John, K.A.Ohagwu*, et al.* in a 2013 systematic review of obesity in Nigeria based on four studies reported that the prevalence of overweight ranged from 20.3%–35.1%. They reported that the prevalence of obesity ranged from 8.1%–22.2%. This was the most recent study found in the literature. This paper was assessed on September 25, 2019.
[15] Okubadejo *et al.* in a 2019 paper compared blood pressure readings of 5365 subjects in urban areas of Lagos, Nigeria to American College of Cardiology/American Heart Association 2017 guidelines. They found 55% of adults to be hypertensive.