

Effects of Tellington Touch in Healthy Adults Awaiting Venipuncture

M. Cecilia Wendler*

Nursing Systems, University of Wisconsin–Eau Claire, Eau Claire, WI 54702-4004

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Abstract: Many natural-healing modalities administered by professional nurses are provided without adequate scientific scrutiny. Tellington touch (TTouch), a form of gentle physical touch originally developed for the calming of horses, is an emerging nursing intervention. However, the safety and efficacy of human TTouch has not yet been established. The purpose of this study, which used a pretest, posttest repeated-measures control group design, was to identify patterns of mean blood pressure (MBP), heart rate (HR), state anxiety (SA), and procedural pain (PP) in healthy adults receiving a 5-min intervention of TTouch ($n = 47$) just before venipuncture versus a no-touch control group ($n = 46$). There were statistically and clinically significant decreases in the TTouch group in MBP and HR. There were no significant differences between groups in SA and PP. Further research is essential to determine the safety and efficacy of this modality for acutely or critically ill patients. © 2003 Wiley Periodicals, Inc. *Res Nurs Health* 26:40–52, 2003

Keywords: Tellington touch; touch; blood pressure; heart rate; state anxiety; procedural pain

Human-to-human touch is a fundamental nursing intervention deeply embedded within nursing practice. Often the first interaction between patient and nurse, touch provides an opportunity for an instantaneous, open connection and serves

as a fundamental form of communication (Butts & Janes, 1995; Hover-Kramer, 1998; Schoenhofer, 1989). Tellington touch (TTouch), a form of gentle, caring touch originally developed by equestrian master Linda Tellington-Jones (1992,

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Correspondence to M. Cecilia Wendler, Nursing Systems, University of Wisconsin–Eau Claire, School of Nursing, Room 265, 105 Garfield Avenue, Eau Claire, WI 54702-4004.

*Associate Professor.

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1995) for the calming of horses, is emerging as a therapeutic intervention that nurses use. More than 15 years of anecdotal evidence (TEAM News International, undated) of use with humans suggests that this simple-to-learn and easy-to-use intervention may be useful in a wide variety of situations (Tellington-Jones, 1992, 1995; Wendler, 1999). However, TTouch has never been formally studied in humans. The purpose of this study was to identify the effects of TTouch on the selected outcomes of mean blood pressure (MBP), heart rate (HR), state anxiety (SA), and procedural pain (PP) in healthy persons awaiting venipuncture.

Montagu (1971) argued that touch, the earliest sense to develop, is the most basic of human senses. Touch supports and promotes the unity of the body–mind through the largest human organ, the skin. As Montagu and Madsen (1979) explained,

A piece of skin the size of a quarter contains more than three million cells, twelve feet of nerves, 100 sweat glands, 50 nerve endings and three feet of blood vessels. Tactile points vary from seven to 135 per square centimeter[s]... In other words, the skin is a giant communication system, which, through the sense of touch, brings the signals and messages of the external environment to the attention of the internal environment: the mind. (p. 90)

As an avenue of learning and as humanizing experience, touch is a primary human need and a fundamental form of communication (Fisher & Joseph, 1989; Montagu, 1971; Montagu & Madsen, 1979; Roy & Andrews, 1991).

Within a nursing context, touch as a therapeutic intervention is commonly used in conjunction with medical and nursing modalities (Candlin, 1992; Hover-Kramer, 1998) or to help patients endure traumatic or painful procedures (Morse & Proctor, 1998). Early studies on the impact of touch in seriously ill hospitalized patients (McCorkle, 1974) helped to establish touch as an important avenue for communicating caring (Montgomery, 1993) and to help patients feel better (Wright, 1995).

In general, touch used within a nursing context can be grouped into two types: contact-based touch and energy-based touch. *Contact-based touch* primarily uses skin-to-skin, glove-to-skin, or instrument-to-skin physical contact as the primary mode of intervention. Examples of contact-based touch include affectional touch (such as hugs and stroking), procedural touch (such as dressing changes and IV insertions), and caring touch (such as Swedish and slow-stroke back massage). A wide variety of research has demon-

strated the benefit of massage for pain (Westland, 1993) and improvement in self-image (Fascione, 1995). Meek (1993) demonstrated that slow-stroke back massage induced relaxation and lowered blood pressure and pulse in elderly hospice clients. Numerous research-based effects found for therapeutic massage were reviewed by Field (1998), who noted that massage enhanced the growth and development of both rat pups and children. Massage helped reduce the impact of acute and chronic pain in adults, and reduced anxiety and depression resulting from pregnancy, labor, and delivery, as well as nursing and medical procedures. Massage also can be of assistance in the management of neuromuscular disorders. Field appropriately noted that some studies had sampling and methodological flaws and that a bias toward positive results was found in the literature; yet concluded that for many persons massage seemed to be beneficial.

Energy-based touch primarily uses skin-to-energy field or energy field-to-energy field contact as the mode of intervention. It includes such interventions as therapeutic touch (TT), healing touch, and Reiki. Energy-based caring touch is a form of healing communication in which nurses use access to a perceptual “flow,” often referred to as a “universal life force” or “energy,” to promote health and well-being. Heidt (1981) conducted a classic study of the impact of TT on the anxiety of hospitalized patients ($n = 90$), comparing a 5-min intervention of TT with casual touch and no touch. Casual touch was described in a clinical manner—participants in the casual touch group had a chest assessment and peripheral HR check as an alternative touch intervention. The no-touch group was not touched in any way. Results indicated a highly significant decrease in state anxiety over the alternative situations. Mulloney and Wells-Federman (1996) analyzed quantitative studies in a comprehensive review of the literature and noted that the physiologic measures of stress reduction (Heidt, 1981; Kreiger, Peper, & Ancoli, 1979; Quinn, 1982; Randolph, 1984) and promotion of wound healing (Wirth, 1990; Wirth, Richardson, Eidelman, & O'Malley, 1993) were positively affected by TT. Again, despite considerable concern about methodological adequacy of many TT studies (Wirth; Wirth et al., among others), TT was found to have a positive, though often small, effect on health and/or well-being of patients.

Tellington touch (TTouch) is seen as more closely related to the contact-based caring interventions listed above than to energy-based touch. TTouch is described as a gentle, massagelike form

of caring touch consisting of four components. They are: a mental attitude of open-mindedness; specific physical touch using hands and fingers; a selective and subjective system of touch employing light to moderate pressure; and simultaneous breath awareness and control. All four of these aspects and the specific techniques used in TTouch are described thoroughly elsewhere (Tellington-Jones, 1992, 1995; Wendler, 1999, 2000).

Whether there is an energetic component to TTouch is still controversial. Tellington-Jones asserted that this touch technique "uses intention and these circular touches to wake up the cell's ability to heal itself through the elemental life force, present within the human" (personal communication, October 8, 2001) and is not specifically energy work from an external, universal source. Thus, there is no movement of energy *per se* through the TTouch practitioner. Rather, TTouch is a form of caring communication (Wendler, 1999) that honors the human being and therefore provides the nurse with an intentional opportunity to communicate caring and re-humanize the sometimes dehumanized health care context (Wendler, 2000, 2002).

Venipuncture is a needle-stick injury that allows venous access for the purpose of blood sampling, a very common procedure encountered by patients, causing distress (Acute Pain Management Guideline Panel [APMGP], 1992). Needle-stick injuries are a form of acute, procedural pain and healthy adults find these painful (Kelley, Sklar, Johnson, & Tandberg, 1997; Kelly & Windslow, 1996). Further, antecubital venipuncture has been found to be the most painful site (VandenBerg, 1996) of venous cannulation. Pain is described as "an unpleasant sensory and emotional experience arising from actual or potential tissue damage or described in terms of such damage" (APMGP, 1992; Priority Expert Panel, 1994). Pain is thought to initiate other physiologic responses, including changes in blood pressure and pulse. The APMG panel identified the importance of touch strategies for reducing the anxiety and pain associated with procedures.

Anxiety is a response to a specific stressor and includes the perception of a danger of some kind (Spielberger & Sydeman, 1994). State anxiety is a momentary sense of apprehension and tension accompanied by activation of the autonomic nervous system, and it occurs over time (Schalling, 1985; Spielberger, 1983). Further, anxiety and procedural pain may affect each other in a linear relationship (APMGP, 1992): as state anxiety increases, so does pain (Chapman & Cox, 1977; Thomas, Heath, & Rose, 1990). Interventions

determined to relieve pain may also relieve anxiety, and vice-versa.

Adaptation nursing theory forms the theoretical underpinnings of this study (Roy, 1984; Roy & Andrews, 1991). Adaptation is seen as a "capacity to adjust effectively to changes" and results in health, a "process of being and becoming a whole person" (Roy & Andrews, pp. 6–7). Adaptation is an intricate, highly inter-related, and integrated process that occurs between person and environment. The person as a holistically adapting system responds to input through the complex processes of coping. These processes unfold through the regulator and cognator mechanisms, which include elaborate neurophysiologic processes as well as learning/perceiving/judging and emotive factors (Roy & Andrews). When a stimulus such as venipuncture confronts and challenges a person, the response is behavioral and results in action. Actions may have internal and/or external aspects that may be "observed, measured or subjectively reported" (Roy & Andrews, p. 12).

In this study venipuncture served as the noxious focal stimulus that threatened adaptation. In Roy's adaptation model, all stimuli act together as initiators of the behavior, which mobilizes the internal regulator and cognator subsystems as the person seeks successful adaptation (Frederickson, Jackson, Strauman, & Strauman, 1991). Within this theoretical framework, then, TTouch as a nursing intervention is thought to act in two ways. First, it serves as a contextual stimulus that may modify the intensity of the noxious focal stimulus, the venipuncture. Second, TTouch may enhance the regulator system, thereby increasing the effectiveness of the adaptive responses. The presence of adaptation through coping was measured in the present study by the reduction of four variables: mean blood pressure, pulse, anxiety, and perceived pain, the first two measured by observation, the latter two by self-report.

The impact of touch on vital signs has been the focus of numerous studies. Meek (1993) found statistically significant decreases in systolic and diastolic blood pressures and heart rate when slow-stroke back massage was given to elderly hospice clients. Other researchers have uncovered a wide variety of human cardiovascular responses to massage. Some investigators have noted trends toward increases in blood pressure, HR, and skin temperature (Bauer & Dracup, 1987; Longworth, 1982; Tyler, Winslow, Clark, & White, 1990), whereas others reported decreases in these same outcomes (Bauer & Dracup; McKecknie, Wilson, Watson, & Scott, 1983; Weiss, 1990). These inconsistent findings have

been attributed to such variables as differences in study populations and the timing of the intervention used (Meek, 1993). However, it is possible that state anxiety and pain may also affect these variables. Thus, although the theoretical framework has suggested expected trends in adaptive responses to TTouch in healthy adults, a review of the current research fails to clearly support this.

The body of research on the impact of touch on outcomes in healthy, acutely ill, and chronically ill persons continues to evolve. However, the relationships, if any, among touch, vital signs, anxiety, and pain along with their interrelationships remain unclear. Further, there have been no studies of TTouch reported in the literature. The current research was undertaken as part of a larger mixed-methods study exploring the effect of and describing the experience of TTouch in healthy adults awaiting venipuncture. The current study was designed to determine the patterns of responses in healthy adults before studying the use of TTouch with acutely ill or critically ill patients. Specifically, the research question for this study was: What is the effect of TTouch on the selected outcomes of mean blood pressure (MBP), heart rate (HR), state anxiety (SA), and perceived procedural pain (PP) in healthy adults awaiting antecubital venipuncture during a clinic visit for a physical examination?

METHOD

Sample

Participants were healthy members of the National Guard in the Midwest who were visiting a troop clinic to undergo a routine physical examination as part of the army's readiness initiative. Soldiers were approached when they arrived at the clinic for their clustered appointments, which involved 2–8 persons (as per routine clinic procedure). A nonmilitary research assistant, who was blinded to group assignment, invited potential participants into the study. Recruitment criteria were: citizen-soldiers, able to read and write English, between the ages of 18 and 60, and arriving at the clinic for a routine physical examination. Participants had to be normotensive without medications, not taking anxiolytics, and presenting with a resting HR of 50–100 BPM.

Initially enrolled in the study were 110 National Guard members, (men: $n = 99$ women: $n = 11$). Fourteen of these 110 participants did not meet the study inclusion criteria (because they had BP in excess of 139 or HR of less than 50) and were

excluded. Three participants were withdrawn because they fainted following venipuncture and were unable to complete the protocol. Thus, 17 participants were removed from the initial group. Participants in the final study ($n = 93$) were 83 men and 10 women randomly assigned to the control group ($n = 46$) or the experimental group ($n = 47$).

There were no differences between the groups in gender, educational level, marital status, and age, and these adequately represented the population from which the sample was drawn, with the population defined by the state's demographic data available for National Guard soldiers. There were also no significant differences between groups in the potential intervening variables of intake of food, caffeine, or nicotine prior to the study; day of menstrual cycle (for women); past experience with venipunctures; baseline measures of MBP and HR; and baseline state or trait anxiety scores. Most participants were young ($M = 29.82$, $SD = 8.61$), white (96%), male (89%), with mild (20–40 on a scale of 20–80) state anxiety at baseline. There were no preexisting statistically significant differences between the two groups in any of these parameters, despite all 4 persons of color (4%) in the study having been randomly assigned to the control group.

Study Protocol

The study was approved in advance by a university-affiliated institutional review board and the state surgeon general. Participants provided written informed consent after explanation of the study protocol and prior to data collection. Participants were free to withdraw from the study at any time, but none chose to do so. Participants were provided with a free continental breakfast, which was offered at the end of the research procedures.

Figure 1 illustrates the flow of patients through the study protocol. Using a pretest–posttest experimental repeated-measures design with computerized random assignment to groups, the independent variable of 5 min of TTouch administered by a nurse was compared with the control condition of a 5-min social visit with a male medic. The use of a medic and no-touch maximized the differences between the two groups, in that communication techniques and caring practice approaches are not normally a part of medic training or practice. Second, the control group condition was created to mimic routine care at the clinic, where it is usual for the medics to pause during the busy workday and chat sociably

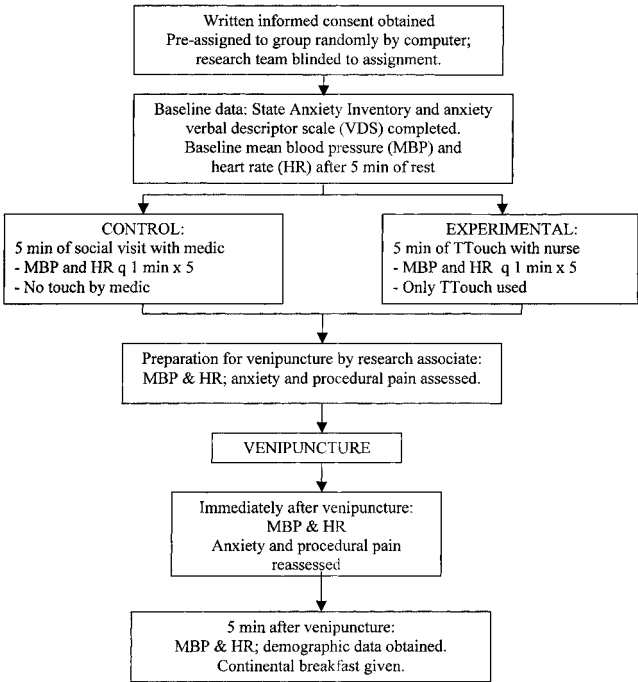


FIGURE 1. Flow of participants through research protocol.

while waiting for completion of the various steps of the physical examination.

Experimental Intervention

Experimental group, independent variable. The independent variable was 5 min of TTouch delivered by a nurse to the social zones of the upper back, upper arms, and shoulders. Participants were clothed and sitting with the feet flat on the floor in a director’s-type chair, with the TTouch practitioner standing alongside. Table 1 lists and describes the forms and duration of TTouch in-

terventions used within the protocol. Another research team member was always present in the room, recording the results of the automated vital sign assessment protocol and observing for consistency in the research protocol. Conversation was not specifically avoided but also was not initiated by the practitioner. There was no ambient music in the clinic, and the room where the protocol was implemented was quiet and well away from the busy area of the clinic where other routine care activities occurred.

Control group. Those participants randomized to the control group entered the protocol in a manner identical to those in the experimental con-

Table 1. Description of Tellington Touch Procedures Within Research Protocol

Time	Name of TTouch	Description
T1	None	Baseline, no TTouch
T2–T4	Clouded Leopard	Using moderate pressure, fingertips and palm of hand are placed and circular motions are used to move the skin clockwise. The opposite hand is placed elsewhere on the participant within the social zone of upper back, shoulder, or upper arms. Duration: 3 min.
T5	Python Lift	Using light to moderate pressure, hand is used to gently lift the skin and support the muscles in a lift-and-release action. Opposite hand remains in contact on back, shoulder, or arm. Duration: 1 min.
T6	Noah’s March	Using moderate pressure, both hands are used in long downward strokes, taking care to touch all areas already touched. Duration: 1 min.
T7–T9		Venipuncture sequence, no TTouch.

dition. The control protocol varied in that, instead of receiving TTouch from a nurse, the participants engaged in a 5-min social conversation with a friendly medic. The medic did not touch the participant at any time during the social visit, and conversations specifically avoided personal or sensitive issues; participants and the medics exchanged information on the day's weather, clinic or military unit activities, and family social news. Conversations were steered to their natural end by the medic at the end of the fifth minute, as timed by the research associate (always present in the room).

Dependent variables: Mean blood pressure (MBP) and heart rate (HR). MBP is a measurement of the mean arterial wall pressure exerted by the heart during cardiac contraction, whereas the HR is a measurement of heartbeats per minute. MBP was measured in millimeters of mercury (mm Hg), and HR was calculated in beats per minute, using a self-calibrating automated external vital signs monitor (Colin Press-Mate Model 880). The device indirectly measured the systolic, mean, and diastolic BPs (in millimeters of mercury) and HR (in beats per minute). The Colin Model 880 was clinically evaluated against stringent criteria for automated BP monitors as outlined by the Association for the Advancement of Medical Instrumentation (AAMI) and was shown to accurately determine BP in a wide variety of adults and along a continuum of BPs (Ling, Ohara, Orime, Noon, & Takatani, 1995). Noninvasive blood pressure (NIBP) devices have been shown to be both reliable and valid in normotensive patients (Rebenson-Piano, Holm, Foreman, & Kirchhoff, 1989).

State anxiety (SA). Anxiety is an unpleasant, affective emotional state self-reported by people as "anxiety" or "anxiousness" that is experienced as a vague sense of unease in a particular situation. State anxiety is a transitory state of anxiety in the here and now, occurs over time (Schalling, 1985), and is affected by residual stimuli (Roy & Andrews, 1991), such as past experiences (Spielberger, 1983). State anxiety was measured at baseline with the State Anxiety Inventory, Form Y (Spielberger, 1983). This is a 20-question, multiple-answer option tool using a Likert-type scale whose possible scores range from 20 to 80, with the lower numbers indicating lower levels of anxiety. Validity and reliability of this tool have been established over a wide variety of situations, with alpha coefficients ranging from .83 and .92 (Ramanaiah, Franzen, & Schill, 1983; Simington & Laing, 1993; Spielberger, 1983).

Research has shown that unidimensional tools are clinically useful when frequent, repeated assessments are needed for the quantification of phenomena (Larivee, Davis, & McGuire, 1992), such as anxiety and procedural pain. In the present study the State Anxiety Inventory was completed just before administration of a baseline measure of an 11-point anxiety verbal descriptor scale (A-VDS) to test its reliability as a single-item proxy for the Spielberger (1983) state anxiety measure. The actual proxy question asked was: "On a scale of 0–10, with 0 being 'no anxiety' and 10 being the 'worst possible anxiety,' how much anxiety do you feel, at this moment?" The correlation between the State Anxiety Inventory and the baseline A-VDS was $r = .42$ ($p = .001$) in this study. This proxy question was used when participants were asked about anxiety at T7 and T8.

Procedural pain. Procedural pain in this study was the pain described as "hurt," both anticipated and perceived (Gaston-Johansson, Albert, Fagen, & Zimmerman, 1990) as a result of antecubital venipuncture in the dominant arm. Perceived "hurt" of venipuncture was measured by the use of a pain verbal descriptor scale (P-VDS). Single-item pain assessment tools have been endorsed by the Acute Pain Management Guideline Panel (1992) for assessment of procedural pain, are culturally sensitive (Gaston-Johansson et al.), and provide quantitative, interval-level data (Lee & Kreckhefer, 1989). The actual questions used the word *hurt*, the recommended descriptor for needlestick injury pain (Gaston-Johansson et al.), as a proxy for "procedural pain." To assess anticipation of pain (VandenBerg, 1996), at T7 the question asked was: "On a scale of 0–10, with 0 being 'no hurt' and 10 being 'the worst possible hurt,' how much hurt do you *anticipate this* [needle] to be?" The question used immediately following withdrawal of the needle (T8), asked in order to assess actual, *perceived* pain, was: "On a scale of 0–10, with 0 being 'no hurt' and 10 being 'the worst possible hurt,' how much hurt *did you have with this* [needle]?"

Procedure

The experimental group received a 5-min intervention of TTouch, administered by a female nurse who had completed the human TTouch training and who had two years' experience as a human TTouch practitioner. TTouch was delivered to the upper portions of a participant's shoulders, back, and arms. All participants had a minimum of nine assessments of BP and HR.

Measurements were initiated after the participants had been seated quietly for 5 min (T1; see Fig. 1) and continued at 1-min intervals during the intervention (T2–T6), just before (T7), just after (T8), and 5 min after (T9) the venipuncture. Measures of state anxiety were obtained at baseline (T1), just before (T7) and just after (T8) venipuncture. Perceived pain measures were obtained just prior to (T7) and immediately following (T8) venipuncture.

All venipunctures were performed in the dominant arm's antecubital space (VandenBerg, 1996) using standardized Vacutainer® equipment with a 21-gauge needle, and the blood pressure cuff was placed on the nondominant arm, per the manufacturer's recommendations. The venipuncture was completed by a certified, registered nurse-anesthetist with more than 20 years' venous cannulation experience, and none of the participants required more than one needle stick to obtain the blood sample. Demographic data were obtained immediately following completion of the protocol (T9).

Data Analysis

Multivariate analysis of variance (MANOVA) is the statistical test of choice for analysis of multiple dependent variables but is highly sensitive to violations of the underlying assumptions of normality and homogeneity of variance. In this study unequal variance/covariance matrices (Tabachnick & Fidell, 1996) persisted despite data transformation. Therefore, the repeated-measures factorial analysis of variance (ANOVA) was used with the Bonferroni correction, in which an alpha of .012 (.05/4) was determined to be the criterion for these four analyses. MBP, HR, SA, and PP had approximately normal distribution patterns, as required for these analyses. Effect sizes, calculated retrospectively, were approximately half a standard deviation in magnitude, moderate to large by Cohen's (1988) heuristic criteria.

RESULTS

Effect of TTouch on Mean Blood Pressure

Overall, repeated-measures analysis of variance (ANOVA) results for mean arterial pressure indicated significant differences by time and group $F(1, 89) = 11.2, p < .001$. Holding group con-

stant, simple main effects of MBP over time were significant for both the control conditions, $F(5.9, 252.5) = 806.0, p < .001$, and the experimental conditions, $F(5.7, 264.2) = 993.8 (p < .001)$. To discover where the differences lay between the groups, simple *t* tests at each time point were calculated (Table 2). These data demonstrated a pattern of significance between the groups during the time the intervention of TTouch was offered (T2–T6), disappearing within 90 s (T7) of completion of the intervention.

Effect of TTouch on Heart Rate

Again, overall repeated-measures ANOVA results showed significant heart rate differences by time and group, $F(1.9, 88) = 3031.6, p < .001$. Holding group constant, the simple main effects of HR over time were significant for both the control conditions, $F(1.8, 79.3) = 1302.5, p < .001$, and the experimental conditions, $F(1.9, 87.2) = 1845.6, p < .001$. Again, to determine where these differences appeared, simple *t* tests were calculated for treatment group at each time point (Table 3). These data demonstrated a pattern of significant differences between the groups during the time the intervention of TTouch was administered, emerging at T2 and persisting through T6. Graphing the means and 95% confidence intervals for both MBP and HR demonstrates a strikingly similar pattern

Table 2. Group Comparisons at Each Time Point for Mean Blood Pressure (mm Hg)

Time	Group		<i>t</i> (df = 91)
	Control (n = 44)	Experimental (n = 47)	
	<i>M</i> (SD)	<i>M</i> (SD)	
T1	89.2 (8.7)	86.0 (10.7)	1.5
T2	92.2 (11.5)	85.3 (9.6)	3.0*
T3	93.7 (8.4)	85.7 (9.5)	4.4**
T4	92.6 (10.7)	84.7 (9.6)	3.6**
T5	93.5 (10.6)	84.1 (9.6)	3.6**
T6	92.3 (9.5)	84.3 (10.5)	3.4**
T7	91.9 (7.6)	88.6 (12.0)	1.4
T8	93.8 (9.5)	93.4 (10.3)	0.4
T9	89.3 (9.9)	89.5 (9.7)	0.1

Note: T1—baseline; T2–T6—visit versus TTouch; T7—just before venipuncture; T8—just after venipuncture; T9—5 min after venipuncture, at rest.

* $p < .01$.

** $p < .001$.

Table 3. Group Comparisons at Each Time Point for Heart Rate (BPM)

Time	Group		<i>t</i> (df = 91)
	Control (n = 44)	Experimental (n = 47)	
T1	M (SD)	M (SD)	
T1	65.6 (10.6)	63.3 (8.5)	1.0
T2	70.7 (13.0)	61.5 (8.7)	4.0**
T3	72.1 (12.4)	63.2 (9.0)	4.0**
T4	71.1 (11.1)	64.1 (9.6)	3.2**
T5	70.9 (12.8)	62.8 (8.7)	3.6**
T6	71.9 (12.0)	64.5 (8.9)	3.4**
T7	71.0 (11.4)	65.6 (9.2)	2.5
T8	68.2 (11.4)	67.1 (8.9)	0.7
T9	67.9 (11.9)	65.1 (8.4)	1.2

Note: T1—baseline; T2–T6—visit versus TTouch; T7—just before venipuncture; T8—just after venipuncture; T9—5 min after venipuncture, at rest.

** $p < .001$.

(Figs. 2 and 3, respectively). There was a distinctive drop in MBP and HR for the experimental group compared with the rising MBP and HR in the control group from T2–T6. This patterning is noteworthy because there were no significant correlations between MBP and HR, the cardiovascular measures that are the classic patient vital signs.

Effects of TTouch on Anxiety and Pain

Using the VDS, mean state anxiety in the control group at baseline was 2.2 ($SD = 2.2$, range = 0–

8), whereas the experimental group's mean was 1.8 ($SD = 1.8$, range = 0–9). Just before venipuncture, those who had not received TTouch reported an average anxiety level of 2.6 ($SD = 2.5$, range = 0–9), whereas those receiving TTouch reported 1.5 ($SD = 1.6$, range = 0–7). Following completion of venipuncture, control group participants experienced a mean anxiety score of 1.6 ($SD = 1.7$, range = 0–6), and the experimental group had a mean anxiety score of 1.2 ($SD = 1.5$, range = 0–7). Thus, anxiety in both groups was low overall. Although ANOVA revealed a significant change over time for anxiety, as expected, $F(1.7, 159.7) = 14.2$, $p < .001$, there was no difference in the change over time by group variable.

In this study procedural pain was reported as *anticipated* pain, reported immediately before venipuncture, and actual, *perceived* pain, reported immediately following venipuncture. Pain *anticipated* by the control group averaged 2.3 ($SD = 1.6$, range = 0–6), whereas pain anticipated by the experimental group averaged 1.7 ($SD = 1.1$, range = 0–4). Immediately following venipuncture, participants in the control reported an average *perceived* pain of 1.4 ($SD = 1.3$, range = 0–5), whereas experimental group members reported an average *perceived* pain of 1.1 ($SD = 1.1$, range = 0–5). Thus, this group of participants experienced low levels of “hurt” with venipuncture. Using ANOVA procedures and the Bonferroni correction, there was no significant difference between groups for perceived pain.

DISCUSSION

Results for MBP and HR revealed similar patterns, reflecting comparable group resting states (Figs. 2

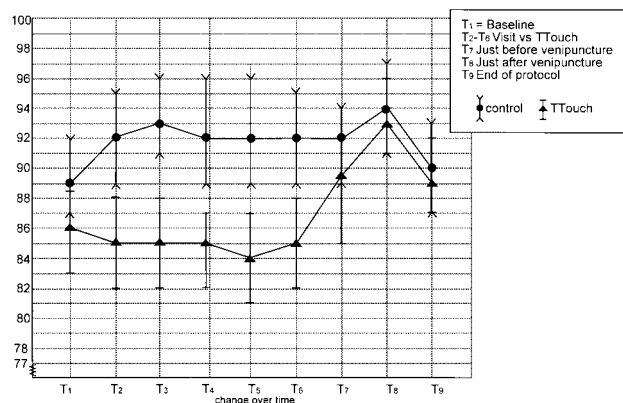


FIGURE 2. Change over time for mean blood pressure, control versus TTouch group, with 95% confidence intervals.

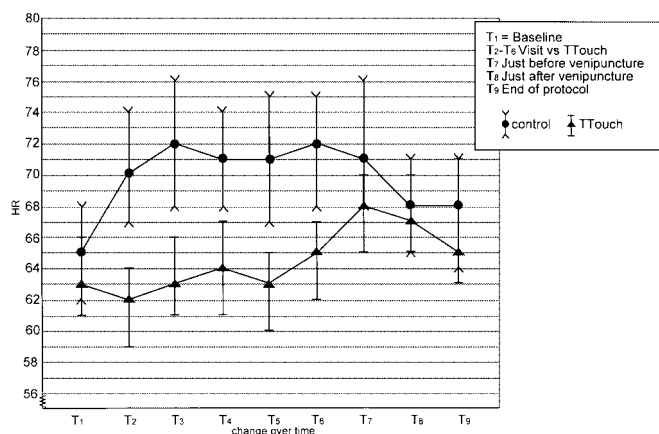


FIGURE 3. Change over time for heart rate, control versus TTTouch group, with 95% confidence intervals.

and 3), with a rise in values for those engaged in a social visit versus a fall in values for those experiencing TTTouch. These changes were statistically significant and persisted through 5 min of the intervention. Within about 30 s of termination of the intervention, the MBP and HR began to equilibrate. By the time in the protocol when the venipuncture and subsequent blood draw were completed and MBP and HR were obtained, at T8, the differences between groups had disappeared. Although a rise in BP and HR postvenipuncture occurred in both groups, values were not significantly different than baseline. This may have occurred because of the rebounding effect, caused by the stimulation of a drop in blood pressure on the aortic arch and carotid baroreceptors (Capstad & Banasek, 2000). It might also reflect activation of the sympathetic nervous system, which includes an increase in both heart rate and blood pressure (Capstad & Banasek). This may be especially pertinent when humans are faced with an imminent threat, such as venipuncture, considering that TTTouch in this study was administered before, not during, venipuncture. However, these changes did not rise significantly above baseline values and returned to the participants' normal values within 5 min of termination of the protocol.

The differences for MBP and HR were not only statistically significant but were also clinically significant, with a difference of 6–10 mm of mercury in MBP over time and a 3–8 beat/min drop of HR over time. These simple main effects were strong, even after correcting for underlying violations of the assumptions for analysis. Thus, there was a clear difference for those receiving

TTTouch versus those experiencing a mimic of routine clinic conditions. If the lowering of blood pressure and heart rate are clinical reflections of the relaxation response (Meek, 1993), then these results would be desirable and may promote adaptation to the threat of a noxious medical procedure in a health care context (Roy & Andrews, 1991). Those receiving TTTouch might also carry a modification of residual stimuli of past venipuncture experiences forward into the next clinical experience, possibly modifying the following venipuncture experience in a different way than the control group. Although the impact of residual stimuli on succeeding experiences of venipuncture was not a focus of the present study, it remains an intriguing question.

Although the MPB and HR differences were powerful, they were transient in these healthy participants, disappearing within about a minute of ending TTTouch, perhaps because of the release of catecholamines when facing an imminent venipuncture, a negative focal stimuli (Roy & Andrews, 1991). The transient nature of TTTouch effects in this study may be viewed as both positive and negative. As a positive change, TTTouch may provide a noninvasive alternative for the temporary control of mean blood pressure and heart rate in a stressful situation, to the facilitation of coping when managing the stress of a transient but painful procedure, such as venipuncture—hence a positive outcome. On the other hand, this pattern may reflect a rebound phenomenon that might be unsafe for some unstable patients and therefore an undesired outcome. It is suggested by the results of this research that TTTouch should be used with caution in patients whose tolerance for

this kind of rapid change in vital signs might be harmful, particularly patients with acute increased intracranial pressure changes and those critically ill patients who require ionotropic agents or other interventions for the minute-to-minute management of blood pressure.

Reports in the literature indicate mixed results on touch and its relationship with changes in human BP, with researchers reporting both increases (Bauer & Dracup, 1987; Longworth, 1982; Tyler et al., 1990) and decreases (McKecknie et al., 1983). The present study supports a prior study of six tactile situations (Weiss, 1990), in which all touch interventions lowered HR and diastolic BP. Ferrell-Torry and Glick (1993) also showed a statistically and clinically significant difference between groups in decreasing MBP and HR when touch was administered. Meek's (1993) research of slow-stroke back massage for homebound hospice patients also demonstrated a statistically significant drop in blood pressure parameters and HR, but the change in MBP (2 mm Hg) in these participants was not as clinically significant as it was in this study.

In the present study there was no statistical difference between the two groups in state anxiety. State anxiety changed minimally over time in both groups. These results are very similar to those reported by Groer et al. (1994), Gagne and Teye (1994), and Brown (1990), all of whom used contact-based touches in their studies. As well, a recent, methodologically sound pilot study of cardiac catheterization patients receiving 15 min of massage failed to show a difference in pain and anxiety related to the procedure (Okvat, Oz, Ting, & Namerow, 2002). However, results of the present study differed from those of an early study, which demonstrated that both casual touch and therapeutic touch decreased the state anxiety of hospitalized patients (Heidt, 1981). Other touch studies support these results (Barrington, 1994; Ferrell-Torry & Glick, 1993; Quinn, 1982; Simmington & Laing, 1993). One interesting finding was that decreases in anxiety were present only in men (Weiss, 1990) and therefore possibly were gender-based. However, this is in contrast to results for the present sample, which was comprised largely of male participants. Thus, it is likely that TTouch is more akin to a traditional massage than to TT.

The average pain of venipuncture *anticipated* in this group of participants was low overall, whereas the actual *perceived* pain of venipuncture was even lower. This differs somewhat from previous studies of venipuncture in children, in which the perceived pain was rated at 3.0 on a scale of 0–

10 (Kelly & Winslow, 1996). Anticipated venipuncture pain for boys was 28.4 ($SD = 29.3$) and for girls was 32.3 ($SD = 29.3$), using a 0-mm to 100-mm scale, a borderline low-to-moderate level of venipuncture pain (Fowler-Kerry & Lander, 1991). In one of the only studies found on IV cannulation in women, the mean of experienced pain of needle stick was 4.2 on a scale of 0–10, a moderate amount of pain (Kelley et al., 1997). It is interesting that no studies on the experience of venipuncture for men were found in the literature. Results of the current study show that TTouch only minimally affected the pain of venipuncture, an effect that likely would not be clinically significant. As well, there may have been a basement effect in the measurement of this kind of procedural pain, or the verbal descriptor scale may have lacked the sensitivity necessary to uncover the pain experienced by the study group.

There may be several reasons for the failure to demonstrate a difference between groups in state anxiety and procedural pain in the present study. First, military people are trained and socialized to ignore what are considered small discomforts for the greater good of the group; revealing anxiety or pain may be seen as a weakness, and soldiers may be subtly discouraged from expressing these feelings. Also, the actual raw scores were primarily in the lower half of the stated 0–10 scale; thus, there was a restriction in the range of scores. Alternatively, it may be possible that the A-VDS lacked sensitivity as a proxy instrument for the State Anxiety Inventory. However, the results suggest that in general these participants did not find venipuncture to be an anxiety-provoking or painful procedure.

In the present study, important fundamental information regarding selected outcomes of TTouch was obtained from a group of healthy persons undergoing a simple venipuncture, and baseline information regarding normative patterning of MBP and HR was obtained while at rest. It appears that TTouch produces a lowered MBP and HR in healthy persons. However, the rebound return to baseline may or may not be a normative response in this situation. Drops in MBP and HR of the magnitude found in the study are clinically significant but probably benign in normotensive, healthy adults. Abrupt increases of MBP and HR, especially if these increases return to baseline, as in this study, also likely are benign in healthy persons. However, if changes of this magnitude occurred in other populations of patients, they might be highly clinically significant. Further research is necessary to determine the safety and efficacy of TTouch for patients with clinically

unstable blood pressure and heart rate. In addition, the literature suggests that it is important to respect the potentially deleterious effects of touch (Bottorff, 1991), including TTouch (Wendler, 2002). Any administration of a nursing therapeutic intervention involving touch should be given with the awareness that not all nurses' touches are welcome (Mulaik et al., 1991).

Although results of the present study provide a beginning understanding about TTouch and its impact on healthy persons in a clinic setting, much more work needs to be done to explicate the effects of TTouch on a variety of patients of all ages experiencing the full range of health states. Specific research questions may include: What is the impact of TTouch on the vital signs of critically ill persons? What is the impact of TTouch on state anxiety and/or fear of needles and procedural pain when TTouch is administered during, not before, a venipuncture? What is the optimal time length of TTouch administration, the optimal sequencing of touches, and the optimal pressure for children, adults, and elders? men and women? What conditions, if any, are worsened or improved with administration of TTouch? Does it matter whether patients receive more than one session of TTouch?

There were several limitations to the study. First, the citizen-soldiers of the Midwestern state may have been a unique population and therefore not similar enough to other groups of healthy young adults to allow comparison. Second, the gender of the friendly medic was male, whereas the nurse (the researcher) was female. The medic was chosen not for his gender but for his personal warmth and his comfort with the rigors of the research protocol for the social visit. The nurse was chosen for her expertise and availability to provide the intervention. The impact of gender on study results was not explored, which is an important limitation of the study results. Third, the embeddedness of TTouch within a nursing situation that includes presence, careful communication skills, focused attention, and skillful ministrations of nursing care may have confounded the impact of TTouch outside the context of caring nursing practice; the impact of the interventionist is unknown.

The results of the study provide the first available data identifying the effect of TTouch on healthy persons. The finding in this study of decreased MBP and HR in response to TTouch leaves intriguing questions about future directions for the use of TTouch in nursing practice and research. Further study is essential to facilitate exploration of the usefulness of TTouch for persons undergoing other noxious procedures and of the safety of its use in acutely or critically ill persons.

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