

The Effect of Touch in Contact Improvisation on Affect, Stress, Sense of Connectedness and Sense of Self.

A Study on the Contact Improvisation Dance Practice – short version!



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Abstract

This study investigated the effects of touch in contact improvisation (CI) on affect, stress, sense of connectedness, and sense of self. For the study was used a within-subject design, in which 48 participants danced in two conditions (dance improvisation without touch, and contact improvisation with touch and sharing weight). Self-reports measured affect (PANAS-p), happiness, stress, sense of connectedness, and sense of self (VAS). Additionally, participants were asked to mark the condition where he/she experienced happiness the most, and to describe the experiences during the two conditions in own words. A comparison of the two dance conditions showed that dancing CI activated more positive affect, and contributed more strongly to a sense of connectedness and sense of self than dancing dance improvisation without touch. Both dance conditions equally reduced stress. In the discussion, limitations of the study, recommendations for future research and for therapeutic practice are mentioned.

Keywords: contact improvisation, dance improvisation, touch, sharing weight, affect, stress, sense of connectedness, sense of self

The Effect of Touch in Contact Improvisation on Affect, Stress, Sense of Connectedness and Sense of Self

Contact Improvisation (CI) is a contemporary dance form which has spread out to be a worldwide social dance form. CI is described as a partnered improvisational dance form without set moves but with high awareness of the communication through touch and sharing weight (Bjerre Jensen, 2020; Stark Smith cited in Pallant, 2020; Pallant, 2006; Paxton et al. 1993) and as explorations of mutual physical cooperation (Paxton as cited in Dymoke, 2014; Paxton et al. 1993). In CI the dancers lean at each other, slide along the bodies' surfaces or roll around a zone of physical contact. They use fundamental movement patterns like yielding, pushing, reaching, pulling and releasing and play with physical forces like gravity, momentum, falling and balancing while being in physical contact. The dancers communicate nonverbally where and how to move, for example from rolling on the floor together to moving in middle of upper levels until possible acrobatic lifts. No two dances are the same, it can have gentle and smooth, playful and funny or athletic and dynamic parts. Besides classes and workshops, the common form for practicing is the jam: like in music jams, the dancers meet each other to dance in informally gatherings where each dancer brings their abilities, limits and experience level with them. Dancers mention in their dance practices many experiences of multifaceted benefits for health and well-being, such as relaxation and stress relief, feelings of happiness, joy and empowerment, feelings of being connected with others and a clearer experienced sense of self and the body. Dancing is well-known as a source of well-being and it may well be that the intense use of touch in CI could deliver additional benefits since research about the value of touch in recent years is auspicious (Björnsdotter et al., 2010; Cox 2020; Ditzen et al., 2008; Grewen et al., 2005; Hammond, 2020; Holt-Lunstad et al., 2008; Light et al., 2005; Morrison 2016; Von Mohr et al., 2017). However, there are only a few scientific studies that research the processes that touch in dance entail (Himberg et al., 2018; Jola, 2020; Kimmel et al., 2018; Marchant et al., 2010; Sarco-Thomas & Zammit, 2020). Himberg et al. (2018) investigated the influence of an

embodied feeling of connectedness concerning aesthetic experiences. Jola (2000) studied transformative bodily experiences through touching, moving, dancing, drawing and writing. Kimmel et al. (2018) found interactivity in touch in CI as a source for creativity. Marchant et al. (2010) found improvement of functional mobility and balance in people with Parkinson disease after dancing CI. Sarco-Thomas and Zammit (2020) found tension release and increased awareness of bodies' characteristics in medical students after CI training. Research about CI might be of interest to promote health and well-being in different populations. In this study, we investigated whether the quality of touch in CI will contribute to the well-being of non-professional dancers. CI could contribute to the well-being of more people and could gain greater therapeutic relevance, for example when embedded in dance/movement therapy or embodied psychotherapy.

The role of touch in contact improvisation and human development

Touch in CI informs dancers about the own body, the partner's body and how to move together (Barrero Gonzalez, 2019; Jussilainen, 2015). Touch informs dancers about direction, weight, balance, strength, dynamics and energy (Kimmel et al. 2018; Pallant, 2006). This information is necessary for developing the dance. The quality of touch can be that light that it slides over the dancers' clothes or skin, or go deeper and reach the tissues underneath the surface, the muscles and even the bones. Touch in CI may be considered as a nonverbal, two-way dialogue process, as form of communication (Houston, 2009; Little, 2014; Marchant et al. 2010). It may convey positive intentions, is assumed to be voluntary, wanted and reciprocal.

The essentiality of touch is recognized in many studies. First, this has been shown when investigated in groups of children in the context of developmental studies. For example, in the orphanages of Romania, children deprived from touch suffered from stunted physical growth, had smaller brains than non-neglected children and showed significant cognitive (MacLean, 2003), neurodevelopmental (Chugani et al., 2011; Nelson, 2007) and socio-emotional delay (Fox et al., 2011; Weir, 2014). Skin-to-skin touch is crucial for the healthy development of babies and children

(Bystrova et al., 2009; Charpak et al., 2005; Diego et al., 2007; Ferber et al., 2004; Field et al., 1986; Kida & Shinohara, 2013; Scafidi et al., 1990; Weiss et al., 2001; Winberg, 2005), and supports development of healthy attachments and long-term relationship (Bigelow & Power, 2020; Chateau, 1977; Duhn, 2010). In moments of stress, touch reduces cortisol level in children and increases their cardiac vagal tone (Feldman et al., 2010). Cortisol is recognized as biomarker for stress-related diseases (Hellhammer et al., 2009) and associated with killing immune cells, especially natural killer cells (Field et al., 2005). Also, it was found that there is a positive correlation between the frequency of maternal touch during play and the strengths of connections in the social brain in five year old children (Brauer et al., 2016). Positive effects of touch were also seen in the field of emotions, since more expressions of positive emotions in middle childhood were observed when children were touched by parents and siblings (Bai et al. (2016).

While touch lays the foundation for a healthy development in earlier years, it remains important later on in life. In adolescence, touch plays a central role in developing humans' sexuality but also in communicating friendship between peers (Böhme, 2019). The value of touch for adults is recognized for example in the UK Touch Study, where 54% of the 40.000 adult participants indicate that they don't get enough touch in their lives (Hammond, 2020). In these times of the pandemic people become more aware of touch and some miss touch strongly (Beßler et al., 2020; Cox, 2000; Field et al., 2020). There is a positive correlation between touch deprivation and depression, body image, self-esteem, aggression and self-injurious behaviors (Punyanunt-Carter & Wrench, 2009). Diverse researchers have reported lots of benefits from touch for adults. It decreases blood pressure and/or heart rate through diverse kinds of touch: through massage (Ditzen et al., 2007; Hernandez-Reif et al., 2000;) and through 'warm touch', described as nonsexual, caring physical touch, such as hold-holding, hugs and cuddling (Grewen et al., 2003a, 2003b, 2005; Holt-Lunstad et al., 2008). Other researchers substantiate that touch leads to a spill out of endogenous opioids (Ditzen et al., 2008; Nummenmaa et al., 2016), which help to relax, to feel good and be more resilient. Numerous

studies show that oxytocin is significantly linked to touch (Heinrichs et al., 2009; Morhenn et al., 2012; Shermer, 2004), to lower cortisol levels (Ditzen et al., 2008; Heinrichs et al., 2003) and to lower blood pressure (Grewen et al., 2005; Light et al., 2005). In addition to these biological impacts, effects of touch were also seen on relational and psychological well-being in adulthood (Debrot et al., 2013; Jakubiak & Feeney, 2017).

CI, touch, sharing weight and affect

CI dancers regularly express feelings of happiness and other positive affects during and after dancing CI (Bruns, 2000; Pallant, 2020, 2006; Sarco-Thomas & Zammit, 2020). There are lots of descriptions of positive experiences perceived through dancing CI (Dymoke, 2014; Keogh, 2018; Little, 2014; Marchant et al. 2010; Novack, 1990; Pourian, 2016; Stark Smith in Pallant, 2020). Sarco-Thomas and Zammit (2020) report an enhanced sense of mindfulness and well-being coming from CI training, also students “feel more fearless”. From a questionnaire handed out to 80 CI teachers, Lemmer Schmid (2020) finds experiencing flow being an important outcome of dancing CI, which is associated with happiness. Dancers in Bruns project (2000) describe experiences of delight and mention that they were simultaneously very awake and relaxed after dancing. Jussilainen (2015) reports increased joy of life. In a CI project with prisoners, positive feelings of enhanced self-esteem and empowerment, even experiences of love and getting attention, were named by prisoners (Houston, 2009).

These positive feelings during or after CI may be explained by the afferent nerve fibers in our skin, i.e. c-tactile afferents or CT afferents being addressed. These fibers respond to gentle, slow stroking (Essick et al., 1999, 2010; Morrison et al., 2011; Olausson et al., 2010) and temperatures similar to those of human skin (Ackerly et al., 2014). Researchers found a strong correlation between the activation of these fibers and perceived pleasantness (Liljencrantz & Olausson, 2014; Löken et al., 2009; Pawling et al., 2017). Touch activates the thermal receptors of the skin. Warmth causes serotonin which is commonly known as a ‘happiness hormone’ and affects the regulation of emotion

(Lowry et al., 2009). Field et al. (2005) reviewed diverse studies confirming an increase of serotonin and dopamine, both of which are associated with positive feelings.

CI, touch, sharing weight and stress

According to the “social touch as a stress buffer hypothesis” (Morrison, 2016), it is supposed that touch can help people to cope with stress and to be more resilient. This may account for the experience of CI dancers that touch and sharing weight in CI lead to stress relief. CI dancers mention that they experience a muscular release in tension during dancing CI (Bruns, 2000; Cooper Albright, 2013; Houston, 2009; Marchant et al., 2010; Mazzaglia, 2013; Paxton et al. 1993). In addition, they experience feelings of mindfulness, because their attention is attracted by the shared zones of touch, and no longer by possible stressful thoughts. Sarco-Thomas and Zammit (2020) name stress relief as a common effect of CI practice, because there is no intention to reach a goal other than exploring movement and touch itself. Paxton states that the focus on the shared zone of contact brings the dancers into the present moment (Paxton & Kilcoyne, 1993), which requires people to remain attentive and have heightened awareness of the presence (Pallant, 2006). Students in Bruns’ project (2000) describe that they were able to let go of hindering thoughts when dancing CI. The results of a study about CI for health care students (Sarco-Thomas & Zammit, 2020) showed a decrease in stress after each weekly session and the entire course in a group of students with relatively high pre-course levels of stress and tension.

Another explanation for the experience of stress relief in CI is the massage effect of sharing weight: CI practitioners typically state that they appreciate receiving weight and compare this regularly with massage (Sarco-Thomas & Zammit, 2020). Previous research has shown that massage therapy is successfully deployed for people with many diverse disorders, for example anxiety disorders (Billhult et al., 2009), depression (Jones & Field, 1999), attention deficit/hyperactivity disorder (Chen et al., 2019; Field et al., 1998a), Autism Spectrum Disorders (Escalona et al., 2001), eating disorders (Field et al., 1998b; Hart et al., 2001), as well as for autoimmune diseases like

rheumatoid arthritis (Field et al., 1997b), multiple sclerosis (Hernandez-Reif et al., 1998) or chronic fatigue syndrome (Field et al., 1997a) and immune disorders like cancer (Hernandez-Reif et al., 2004, 2005; Post-White et al., 2008; Russell et al., 2008;) and HIV (Diego et al., 2001; Ironson et al., 1996). Beneficial effects of massage may be explained by an increase of vagal activity during moderate pressure massage (Diego et. al., 2004, 2007; Field & Diego, 2008), which means an activation of the parasympathetic nervous system followed by slowing down the physiological processes and a reduced cortisol level (Ditzen et al., 2007; Field et al., 2005; Porges, 2001). In addition, massage also increases oxytocin levels (Tsuji et al., 2015), which plays a big role in stress relief (Holt-Lunstad et al., 2008; Uvnäs-Moberg et al., 2005).

CI, touch, sharing weight and the sense of connectedness

Contact dancers describe CI as an opportunity to relate to others (Barrero Gonzalez, 2019; Houston, 2009; Jussilainen, 2015). They state that CI enables strong social connections between dancers (Cooper Albright, 2013; Jussilainen, 2015; Keogh, 2018; Pallant, 2006; Pourian, 2016). Sharing weight means giving and receiving support, which at first takes place on a physical level, but can be felt also on an emotional level (Houston 2009; Jussilainen 2015). For being able to offer weight, the dancer needs to feel trust and support (Jussilainen, 2015; Pallant, 2006), especially if they offer full weight during lifts. The receiving dancer supports the partner in a way that they can be safe in their position. Besides, sharing weight means presenting the own body with its instabilities and vulnerabilities (Little, 2014; Pourian, 2016). And therefore, a kind of intimacy may be established which connects the dancers.

Touch can cause strong feelings of connectedness. Oxytocin, which plays a crucial role in creating attachment and connectedness, is strongly linked to touch (Beckes et al. 2015; Bigelow & Power, 2020; Duhn, 2010;). As already mentioned, touch causes warmth on the skin and physical warmth is associated with sympathy and interpersonal affection (Williams & Bargh, 2008). Vice versa, feelings of social exclusion have an effect on skin temperature which in this case decreases

(Ijzerman et al., 2012). Von Mohr et al. (2017) demonstrated that even gentle touch by a stranger may reduce feelings of social exclusion. So, in conclusion, the warm touch in CI and the shared weight may strengthen the dancers' experienced sense of being connected.

CI, touch, sharing weight and the sense of self

The sense of self means being subjectively aware of one's own existence (Leary & Buttermore, 2003). Tactile experience plays a big role in becoming aware of the self (Montagu, 1978; Stern, 1985). CI teachers and dancers associate touch and sharing weight with a clearer sense of self (Barrero Gonzalez, 2019; Bruns 2000; Dymoke, 2014, 2000; Little, 2014). With the help of the CI partner's body seen as a structure that offers resistance, both CI dancers perceive their own bodies, their bodies' weight, limits and singularity more clearly (Barrero Gonzales, 2019; Pallant, 2006). CI students confirm this experience (Bruns, 2000; Sarco-Thomas & Zammit, 2020). According to CI expert opinions, the combination of touch and movement in CI will lead to increased self-discovery (Dymoke, 2014). Metzinger is convinced that "Owning your body, its sensations, and its various parts is fundamental to the feeling of being someone" (Metzinger as cited in Reddy et al., 2019, p. 471).

Researchers acknowledge the importance of touch for the sense of self. More specifically, the experience of body ownership through touch (Jenkinson et al., 2020) leads to self-consciousness of the own body. De Vignemont et al. (2009) found that tactile stimulation during motor action results in perceiving the body as an entity. In addition, researchers showed that stimulation of the specific tactile nerve fibers – the CT afferents - activates the insular region of the brain (Björnsdotter et al., 2010; Gordon et al., 2013; Olausson et al.; 2002), which processes interoceptive impulses. Interoception helps to perceive in which state the body currently is in which facilitates a clearer sense of self. Gentle touch of the skin is - due to it being linked to the insular region - assumed to form a connection between extra-personal stimulation and the intra-personal world (Cascio et al., 2019; Cruscianelli et al., 2018).

Present Study

The central research question of this study is: Can touch and sharing weight in CI contribute to positive affect, stress relief, sense of connectedness and sense of self among non-professional dancers? Empirical studies associate these four variables with touch, they emerge frequently in CI literature and document experiences of CI dancers. Therefore, we expect that dancing CI, by mean of more touch will activate positive affect, will contribute to stress relief, will increase the sense of connectedness between dancers, and will contribute to their experiencing more clearly a sense of self. Self-report measurements are used to investigate the four variables.

The goal of this study is to expand the theoretical and practical knowledge of the processes of touch in CI for well-being. The study aspires to establish CI as a practice for prevention, as an intervention of DMT, for becoming part of embodied psychotherapy and for enjoying the numerous benefits from touch in dance. The results may encourage a broader group of health workers to implement CI in diverse fields like prevention or therapy.

Hypotheses

H1: Dancing CI activates more positive affect than dance improvisation without touch among non-professional dancers

H2: Dancing CI contributes more strongly to stress relief than dance improvisation without touch among non-professional dancers

H3: Dancing CI increases the sense of connectedness more strongly than dance improvisation without touch among non-professional dancers

H4: Dancing CI contributes more strongly to a sense of self than dance improvisation without touch among non-professional dancers

Method

Design

The study design consisted of a within subject-design, in which each participant engaged in every condition randomized cross-over. In one condition the dancers improvised without touch, in the other condition they danced CI. There were four testing moments for the self-report measurements (VAS and PANAS-p): before and after each condition. Independent variables were dance improvisation (DI) without touch and CI with touch and sharing weight.

Participants

Participants were recruited in several towns in Germany, namely in Aachen, Cologne and Bonn. In these towns, the facilitators of CI events were contacted and informed about the study. Facilitators or other experienced CI dancers were asked to assume the role of a dance partner for the participants. Through facilitators' mailing lists, the members of the CI groups in these towns were asked to participate. Additionally, a post for people in nearby regions was published in social media. We announced that the study aims to investigate the effects of DI and CI on well-being, as it was also formulated in the information letter.

In order to answer the research question, a total sample of 48 participants is needed to get a power of .80, which was measured by G-power program statistics (tests: repeated measured, within factors MANOVA) (Faul et al. 2007). Participants needed to have more than half a year of CI dance experience and to report to be in good mental and physical health. An exclusion criterion was if they were dancing professionally. Participants participated voluntarily in the study and gave their informed consent. In total 48 participants were recruited and analyzed in SPSS, men $N = 16$ (33,3%), women $N = 33$ (66,7%), aged between 29 – 70 years ($M = 50.15$, $SD = 10.83$), three participants had less than 1 year, but more than a half year experience in dancing CI $N = 3$ (6,3%), 21 participants had more than 1 year, but less than 5 years experience in dancing CI $N = 21$ (43,8%), nine participants

had more than 5 years, but less than 10 years experience in dancing CI $N = 9$ (18,8%), 15 participants had more than 10 years experience in dancing CI $N = 15$ (31,3%).

Conditions

The study consisted of two conditions for dance duets. Condition DI: The participants were invited to dance and improvise with a dance partner without touch and sharing weight. Condition CI: The participants were invited to perform a contact improvisation dance duet with touch and sharing weight. In each condition, the duo performed ten minutes, without music and without talking. In both conditions, the participants were instructed to start with slow movements for two minutes, to develop more dynamic movements and to end with slow movements in the last two minutes. The time frame was monitored: a sound signal and a recorded voice announcement indicated the start of the dance with slow movements, the development of more dynamic movements after two minutes, the dance with slow movements two minutes before ending, and the end when the 10 minutes were completed. In both conditions, the participants danced a duet together with a predetermined dance partner. The dance partner was a facilitator of CI or another experienced CI dancer.

Measurements

Participants' characteristics

Demographic data were collected, including age (in years), gender (male/female/diverse), and experience in CI in years.

Positive affect

Positive affect variables were measured by the PANAS (Crawford & Henry, 2004). We used PANAS-p, the positive items of the Positive and Negative Affect Schedule, in order to measure the positive affect before and after the different conditions. The PANAS-p contains 10 items measured positive affect: enthusiastic, interested, determined, excited, inspired, alert, active, strong, proud, and attentive. The total scores were measured on a 5-point Likert scale, in which participants experienced positive affect (1 = hardly or not at all, 5 = strongly). A high score (minimum 10,

maximum 50) referred to a high experience of positive affect. The PANAS-p subscale has a high reliability, alpha reliabilities for the positive affect scale ranging from .86 to .90 (Watson et al., 1988). We used the validated German version of the PANAS (Janke & Glöckner-Rist, 2014). In the PANAS-p questionnaire the original English items were named beside the German items. The participants were asked to rate the items in the current moment, in order to assert the direct effect of the conditions. All measurements were entered digitally on a laptop that was present in the room where the dances were performed, so the experiences of the participants before and after the conditions were measured directly and were compromised by other factors as little as possible.

Happiness, feeling stressed, sense of connectedness, sense of self

For the measurement of the dependent variables happiness, feeling stressed, sense of connectedness, and sense of self, we used four different digital visual analog scales (VAS). By placing a perpendicular line on a horizontal line (100mm) the participant indicated how strong he/she experienced the variable. The left side represented the minimum score ("don't feel this at all"), the right side presented the maximum score ("feel this really strongly"). The number of millimeters between the minimum score and the line placed by the participant was the VAS score. A high score on the VAS showed that the variable has been experienced to a high degree. A digital VAS for measuring anxiety had acceptable psychometric properties according to Rossi and Pourtois (2012).

Additional questions on experiences during the movement conditions

After completion of the whole experiment participants were asked to mark the condition where he/she experienced happiness the most. Besides that, we asked to describe the experiences during the two conditions in own words. The answers were audio-recorded.

Ethical considerations

We presented the study to the cETO for ethical approval. The participants were not patients and were neither requested to fulfill critical actions or asked to answer emotionally afflicting or disturbing questions. The participants were familiar with dance improvisation and contact

improvisation, which was already part of their personal practice. They received information about the research procedure by email before the study experiment. They participated completely voluntarily, after having agreed to sign the informed consent. They were able to stop participating at any time. Dancing in the conditions was not be excessively exhausting. There was a resting period in between the conditions, during which the participants may drink water, tea or coffee. It was possible to fill out the questionnaires within a very short time, which not generated strenuous effort. The whole procedure had a duration of 60 up to 70 minutes. Data collection, data processing and publication took place in an anonymized way.

Procedure

For recruitment, information about the purpose of the study was provided and in- and exclusion criteria were inquired. All participants received an email with information about the procedure and the informed consent. The study was executed in quiet rooms, specifically a dance studio in Aachen, an Aikido studio in Cologne, a dance studio in Cologne and a sports hall in Bonn. When the participant arrived, he/she was welcomed and instructed about the process of the study. The participants were asked to read the informed consent and if they agreed, to sign it. The participants were asked to draw a card that specified which dance to start with, DI or CI. We prepared a total amount of cards in a box, 25 for starting with DI and 25 for starting with CI. The drawn card was destroyed.

All questionnaires were presented to the participants on the laptop and they got explanations on how to technically fill in their possible answers. The participants were asked if there were questions about the procedure. Next, they were asked to take off jewelry and accessories.

Before performing the first condition, the participants started to fill in the participants characteristics (age and gender), experience in CI in years, the first dancing style, the VAS and the PANAS-p (pre-test for the first condition) on the laptop, that was present in the room where the dances took place. Then they got warm-up-instructions to rotate the joints in different directions,

stretch the muscles and activate the spine. After a 5-minute warm-up they were asked to find a place nearby the dance partner. The director of the study started the 10-minute recorded time-frame with sound and voice signals for starting/ending and the 2-minute slots. After performing, the participants filled out the VAS immediately in order to determine to which degree they experienced the VAS variables and the PANAS-p in order to describe their affective state in the current moment (post-test for the first condition). Then they had a 10 -minute break without talking about the dances. After the break, the participants filled out the VAS and the PANAS-p again (pre-test for the other condition). Then the 5-minute warm-up was repeated. After the warm-up they were asked again to find a place nearby the dance partner, and the director of the study started the same 10-minute recorded time-frame. The dancers performed the other condition and thereafter the participants scored immediately the VAS and the PANAS-p again (post-test for the other condition). After completing the two conditions and scoring the variables, the participants were asked to mark the condition in which they experienced happiness the most. Beside that they were asked to describe their experiences in the two conditions with their own words.

Data Analysis

The data were analyzed by statistical program IBM SPSS statistics 28 for Mac. The statistical significance (p) was determined at 0.05.

(...)

Results

Data exploration

(...)

PANAS-p

Based on the analysis, condition CI had the highest increase from pre-test to post-test, followed by condition DI which increased from pre-test (...) to post-test (...).

VAS happiness

Based on analysis, condition CI had a more pronounced increase from pre-test (...) to post-test (...), compared to condition DI which increased from pre-test (...) to post-test (...).

VAS feeling stressed

(...) There was no significant interaction effect (...).

We noticed the different stress levels before dancing. Therefore, we checked the data according to the order of the dances. We found that dancers had more stress before the first dance, when the first dance was dance improvisation. Before the second dance, stress level was approximate equal regardless of which dance the dancers danced first.

VAS sense of connectedness

Based on analysis, condition CI had a more pronounced increase from pre-test (...) to post-test (...), compared to condition DI which increased from pre-test (...) to post-test (...).

VAS sense of self

Based on analysis, condition CI had a more pronounced increase from pre-test (...) to post-test (...), compared to condition DI which increased from pre-test (...) to post-test (...).

Additional question

Results of the question at the end of the experiment on experience of the participants showed that 83% of the participants ($N = 40$) have reported condition CI for having caused the strongest feeling of happiness, followed by condition DI with 17% of the participants ($N = 8$).

Discussion

In this study, we investigated the effect of touch in contact improvisation on affect, stress, sense of connectedness and sense of self. The results show that both dances - dance improvisation and contact improvisation - increased positive affect, happiness, sense of connectedness and sense of self, but performing contact improvisation with touch and sharing weight showed a larger increase in positive affect, happiness, sense of connectedness and sense of self than performing dance improvisation. According to the results, our first, third and fourth hypothesis can be confirmed. Condition CI was also identified by the majority of the participants as the condition that increases happiness the most. Besides, results show that both dances decreased feeling stressed. The results show no difference on stress decline between the conditions, which does not support our second hypothesis, that dancing CI contributes more strongly to stress relief than dance improvisation without touch.

Our findings are in line with prior research, which have already shown that there is a strong correlation between touch and positive affect (Debrot et al., 2013; Ditzen et al., 2008; Pawling et al., 2017), specifically between touch and relational and psychological well-being (Jakubiak & Feeney 2017), touch and expressions of positive emotions (Bai et al., 2016), and touch and pleasure (Liljencrantz & Olausson, 2014; Löken et al., 2009; Nummenmaa et al., 2016). Descriptions of experiences in the two conditions from the interviews at the end of the experiment were consistent with the results of quantitative analyses on positive affect. In interviews, participants mentioned a lot of expressions about positive experiences in both dances, for example about playfulness,

surprises, curiosity and flow experience. Also positive affect was mentioned in both dances like having fun, joy, happiness, feel free and the feeling of being alive. Regarding our first hypothesis, that dancing CI activates more positive affect than dance improvisation without touch, it was noticeable that in statements about CI, participants more often named positive reactions and a wider range of reactions, for example vitality, the feeling of being nourished and getting energy, of which the latter term is in line with prior research of Fields (2005), who reports the activating effects of touch. Figure 1 in the appendix shows an overview over mentioned positive experiences in the two dances. The terms from interviews were consistent with CI literature, in which CI teachers and dancers describe their experiences during CI. They also mentioned playfulness (Bruns, 2000; Pourian, 2021; Jussilainen, 2015), curiosity (Keogh, 2018; Stark Smith cited in Pallant, 2020), flow experience (Lemmer Schmidt, 2020), joy (Houston, 2009; Jussilainen, 2015), happiness (Sarco-Thomas & Zammit, 2020), being alive (Pourian, 2021; Stark Smith cited in Pallant, 2020), vitality (Pallant, 2006; Sarco-Thomas & Zammit, 2020), the feeling of being nourished (Pourian, 2021), and getting energy (Bruns, 2000; Pallant, 2006) as experienced aspects of CI. Our research adds value to this richness of experience through its experimental study design in which experiences before and after dance, and experiences in dance with and without touch are compared using a substantial amount of participants.

Interestingly, in the interviews, we found also statements about negative affect in both dances. There were more descriptions and a wider range of negative experienced aspects in statements about DI, for example being bored, feel insecure/have doubts, feel more exhausted, strenuous, and be at one's own mercy. Figure 2 in the appendix shows an overview over mentioned negative experiences in the two dances. The statements about more positive affect in CI and more negative affect in DI support our hypothesis that performing CI increased more positive affect than performing DI.

Our findings about sense of connectedness support prior research, which have already shown that touch can cause or reinforce feelings of connectedness (Bigelow & Power, 2020; Böhme, 2019; Chateau, 1977; Duhn, 2010; Nummenmaa et al., 2016; Von Mohr et al., 2017). The quantitative results of our research showed for sense of connectedness the most pronounced difference between the dances. In the interviews at the end of the experiment, we heard also specifications about sense of connectedness in the two dances. For DI, three participants described to feel more connectedness because they had to be more active to establish the feeling of connection, including through frequent eye contact. There were more expressions and more details about connectedness in CI, for example about sense of trust, closeness, deep communication and feel safe and secure. This is consistent with research that has found a link between touch, experiences of safety and connectedness (Jakubiak & Feeney, 2017) and between touch, feeling close, and connectedness (Debrot et al., 2013). Figure 3 in the appendix shows aspects of sense of connectedness in CI mentioned in the interviews. Several participants tried to declare during the interviews why they feel a strong connectedness and why they experience not to be isolated anymore while dancing CI. They described to feel like one being, because it is no longer clear to separate which impulses come from whom. This is in line with what CI founder Paxton describe as third entity (Lenk3rad, 2014). Three other participants described the encounter about touch as very human and natural to experience, which experienced CI dancers mention in CI literature (Dymoke, 2014; Pourian, 2016).

Our findings about sense of self are in line with prior research which emphasize the link between touch and self-consciousness of the own body (Cruscianelli et al., 2018; Jenkinson et al., 2020) and the link between touch and interoception (Björnsdotter et al., 2010; Cascio et al., 2019; Gordon et al., 2013; Olausson et al., 2002). Descriptions of experiences from the interviews were consistent with the results of quantitative analyses on sense of self. We found expressions in interviews about sense of self in both dances. For DI, four dancers stated to have more sense of self

in DI, where they said that they are more able to feel their own impulses and more able to relate to themselves. Twice as many participants noted in interviews that dancing CI led to more sense of self, describing that they were more aware of themselves and more in touch with themselves which is also mentioned in CI literature (Bruns, 2000; Dymoke, 2014; Pallant, 2006). Many of our participants specified the awareness of their own body, for example to feel themselves from the inside or to feel at home in the own body. One participant explained it like this: “When you feel boundaries, you sense yourself better than when you don't have boundaries, and there the other body was my boundary and led me to be able to sense myself well”.

Our second hypothesis, that dancing CI contributes more strongly to stress relief than dance improvisation without touch, was not supported. Results showed that both dances decreased stress. However, we found no difference in stress decline between the dances. This is not in line with previous research showing that touch can lead to stress reduction (Diego et al., 2004, 2007; Field et al., 2005; Field & Diego, 2008; Holt-Lunstad et al., 2008; Porges, 2001). An explanation for this discrepancy can be that we found that dancers had more stress before the first dance, when the first dance was dance improvisation. We found this by checking the data according to the order of the dances. Before the second dance, stress level was approximate equal regardless of which dance the dancers danced first. It could be that this elevated initial stress level before dancing DI, decreased during the dance when participants realized that they could do the task well, which could have provided the same decrease in stress in DI as in CI. Another explanation is that pure body movement can lead to stress reduction (Field et al., 2020; Liu et al., 2015; Teixeira et al., 2016; Zschuke et al., 2015). Interviews did not agree with the quantitative analysis. Participants reported experiencing more relaxation and more mindfulness through dancing CI, for example to be able to ‘switch of the head’, which is in agreement with previous research on CI (Lemmer Schmid, 2020; Sarco-Thomas & Zammit, 2020;). Figure 4 in the appendix shows that expressions in interviews support our second hypothesis. In the interviews, participants mentioned for DI more aspects that

could trigger stress, for example the need to think more, the feeling like you have to perform something and the feeling of having to create the dance from your own impulses. In the interviews, there were significantly more statements about challenges experienced as strenuous in DI. Given the discrepancy from the quantitative analysis and the interviews, further research should be done on effects of CI on stress.

Other interesting findings from the interviews were descriptions of CI as a good exercise to become aware of one's own needs and to distinguish oneself from others, which can be experienced as very personality strengthening confirmed by CI pioneer Stark Smith (Stark Smith in Pallant, 2020). Furthermore, participants named sustainable resilience-building impacts, which is in line with CI literature (Cooper Albright, 2019; Houston, 2009; Jussilainen, 2015; Keogh, 2018) and the possibility to break out of one's patterns, which was already a goal in the early days of the CI and is described in numerous CI literature (Houston, 2009; Kimmel et al., 2018; Pallant, 2006; Pourian, 2016; Stark Smith cited in Pallant, 2020).

In addition to all the qualitative statements in interviews, literature and previous studies about CI, our experimental study design in which we compared experiences before and after dancing and experiences in dance with and without touch goes more in the direction of causality and provides a meaningful and insightful contribution to more knowledge about CI.

Limitations

This study has several limitations. For not all variables, the normality assumption is met, while the minimum number of participants calculated in the G-power analysis was met. We propose to be cautious by interpreting the effects from the data-analysis and to replicate this study.

In our case, participants took part who already like to dance CI otherwise they probably would not join up. This could indicate that they also experienced and evaluated dancing CI in a positive way.

Other explanations of the results could be that participants wanted to be “good” participants and provided the desirable answers (expectancy effects). The measurements were quite transparent in study intent. Besides, the dancers from this region often know each other. Relatively many dancers knew the director of the study from CI practice in the region. It could be that they wanted to do her a favor by answering positively for CI. Regarding the dance duets, in some cases the dancers knew each other only by sight, in many cases they already danced together, which they named as an advantage, in a few cases they did not know each other yet. So, there were no consistent preconditions. It should be noted that CI practice is often similar. At jams and workshops, you meet people you have danced with and people you have not danced with.

Furthermore, the breaks between the dances could not be compared. We did not pay enough attention to the fact that the break can also influence the rest of the dance. In the first two dances we insisted on not talking, but we had not provided a break room, so we were silently together in the same room. This was unnatural and oppressive, so we decided to allow small talk. We pointed out and made sure not to talk about the dances. This was respected. The small talks were of course not comparable. It probably made a difference in the process whether people were talking about a nice weekend event or the pandemic. We have not registered the content of the conversations, therefore we are not sure if they had any influence.

It should be noted that in this study participants were asked to move 10 minutes in both conditions. There were five statements in the interviews, that this time frame was a limitation and too short to develop some kind of flow while dancing CI. There were also comments that the time was experienced as longer in DI and that it felt enough when the time was over. Therefore, we expect that dancing CI in a longer timeframe may strengthen the results for CI, but may weaken the results for DI.

Future research

More studies are needed to gain more scientific insight into the effects of touch in CI. When using a within-subject design, it would make sense to pay more attention to the design of the break between the dances. We would recommend a break room to minimize the impact of breaks on the course. We think about a quiet room where you can drink something on your own, but have no talks to anyone. To avoid a possible bias of positive scorings for CI because of knowing the director of the study, the study should be performed in another region.

It would be useful to use a larger sample size to make sure the normality assumption in the statistical analysis becomes better. In addition, it would be interesting for future research to use a clinical population after introductions to CI and dance improvisation. This way, if a same study would provide equivalent of stronger results that could be used as arguments for prevention and therapy. It would also be interesting to conduct the study in a clinical group over a longer period of time, several weeks or months, to investigate CI as a therapeutic intervention using pre-, post- and follow-up measurements. Another interesting research design would be a randomized controlled trial, with three clinical groups, in which one group would take part in CI for several weeks or months, one group would take part in DI for the same time span and a control group. In this way, one could examine how outcomes change over time and which dance form would be more appropriate for clinical groups.

Given the discrepancy from the quantitative analysis and the interviews about effects on stress, further research should be done on effects of CI on stress. It would also be very interesting to further investigate the sustainable effects with impact on resilience mentioned in interviews. What are the effects and how long do they last?

Recommendations

The results of our study showed that CI can have several positive effects on affect, sense of connectedness and sense of self, aspects that may be important in promoting mental health.

CI could be helpful for people with depressions due to the proven increase in positive affect. By significantly increasing the sense of connectedness, CI could have a therapeutic value for people who are lonely or isolated, which is the case with many mental disorders. The increase in sense of self through CI could help people who have a lack of sense of their own body, for example people with psychosomatic complaints or people with eating disorders.

We find it important to point out that CI is not for everyone, which is confirmed in the interviews. Careful preparation and sensitive introduction in little steps are needed, especially if CI is to be used for therapeutic purposes. It needs a safe space, confidence and the wish, to touch and be touched. To have consent and to respect boundaries is essentially, what has been increasingly discussed in CI literature in recent years (Beaulieux 2019; Ceder, 2019; Williams, 2016). It is felt to be extremely important to be able to step out of contact and out of touch at all times, which means that it should be possible to move away from the dance partner at any time. In addition, it should be obvious to change partner and/or to have time to dance on your own when desired. The ability to pay attention to one's own needs, to take good care of yourself and to distinguish oneself from others is an important topic and needs to be practiced. This is where learning and a sense of achievement, but also too much demands, can occur. Therefore, in our opinion the facilitator of CI needs to speak openly about these topics and should name and show possibilities to feel safe. Practicing the 'no' is possible in form of partner exercises, as suggested by experienced CI teachers (Cheng, cited in Pallant, 2006; Keogh, 2018). There is also the possibility, to use safety rules for CI events, which is practiced in various places. When there is difficulty in going into touch, gender-based groups might be an option. Besides, there should be the possibility to share personal experiences in a safe space and reflect on it.

Our study - with non-professional participants with an average age from 50 years - showed, that CI is not only for young well-trained people. If there is no requirement for acrobatic performance, it is possible to practice CI until higher age, provided the body is mobile and the bones

can bear the weight. The UK touch study (Hammond, 2020) has shown that 54% of the 40,000 participants wanted more touch in their lives. This number is likely to have increased in these pandemic times, as some studies already has shown (Beßler et al., 2020; Cox, 2000; Field et al., 2020). In clinical settings, it must be well considered and observed which patients could benefit from CI and which could be overwhelmed. The UK touch study (Hammond, 2020) has found that personality traits and trust in other people determine how pleasantly people received touch. This must be taken into account in the therapeutic setting. Nevertheless, there are already promising approaches to use CI in therapy (Barrero Gonzalez, 2018; Houston, 2009; Jussilainen, 2015; Marchant, 2010).

Current literature clearly emphasizes the importance of body work in psychotherapy (Fogel, 2020; Payne et al., 2015; Van der Kolk, 2015), which should encourage to explore new therapeutic pathways of which CI could be one.

Conclusion

The outcomes of this present study showed that dancing CI has several positive effects. Comparison of the dance conditions showed that performing contact improvisation with touch and sharing weight increased positive affect, sense of connectedness and sense of self more than performing dance improvisation while both dance forms decreased feeling stressed equally.

It will be necessary and preferable to do more research onto this research topic by using larger (clinical) population samples to investigate the effects on depression, loneliness, psychosomatic complaints and other mental health topics.

Our study is highly relevant in our increasingly low-touch society. CI provides an opportunity to experience, practice and enjoy touch in a positive way and to learn from it, within the - at the same time open but defined - framework of this dance form. Results of this study serve as a first scientific foundation for the application of CI in DMT or embodied psychotherapy under the above-named conditions.

References

- Ackerley, R., Backlund Wasling, H., Liljencrantz, J., Olausson, H., Johnson, R.D. & Wessberg, J. (2014). Human C-tactile afferents are tuned to the temperature of a skin- stroking caress. *The Journal of Neuroscience*, 34(8), 2879–2883. <http://dx.doi.org/10.1523/JNEUROSCI.2847-13.2014>
- Bai, S., Repetti, R. L. & Sperling, J. B. (2016). Children’s expressions of positive emotion are sustained by smiling, touching, and playing with parents and siblings: A naturalistic observational study of family life. *Developmental Psychology*, 52(1), 88–101. <https://doi.org/10.1037/a0039854>
- Barrero González, L. F. (2018). Dance as therapy: embodiment, kinesthetic empathy and the case of contact improvisation. *Adaptive Behavior*, 27(1), 91–100. <https://doi.org/10.1177/1059712318794203>
- Beaulieux, M. (2019). How the First Rule Brought #MeToo to Contact Improvisation. *Contact Quarterly*, 44(1), 46-50. [https://contactquarterly.com/cq/article-gallery/view/how-the-first-rule-brought-metoo-to-contact-improvisation#\\$](https://contactquarterly.com/cq/article-gallery/view/how-the-first-rule-brought-metoo-to-contact-improvisation#$)
- Beßler, R., Bendas, J., Sailer, U. & Croy, I. (2020). The longing for Interpersonal Touch Picture Questionnaire. *International Journal of Psychology*, 55(3), 446-455. <https://doi.org/10.1002/ijop.12616>
- Bigelow, A. E. & Power, M. (2020). Mother–Infant Skin-to-Skin Contact: Short- and Long-Term Effects for Mothers and Their Children Born Full-Term. *Frontiers in Psychology*, 11, 1-9. <https://doi.org/10.3389/fpsyg.2020.01921>
- Billhult, A. & Määttä, S. (2009). Light pressure massage for patients with severe anxiety. *Complementary Therapies in Clinical Practice*, 15(2), 96–101. <https://doi.org/10.1016/j.ctcp.2008.10.003>

- Bjerre Jensen, D. (2020). Facilitating Thinking-Touch through Process Philosophy and Contact Improvisation. In Sarco-Thomas, M. (Ed.), *Thinking Touch in Partnering and Contact Improvisation: Philosophy, Pedagogy, Practice*, 104-128. Newcastle upon Tyne: Cambridge Scholars Publishing.
- Björnsdotter, M., Morrison, I. & Olausson, H. (2010). Feeling good: on the role of C fiber mediated touch in interoception. *Experimental Brain Research*, 207(3–4), 149–155.
<https://doi.org/10.1007/s00221-010-2408-y>
- Böhme, R. (2019). *Human Touch: Warum körperliche Nähe so wichtig ist* (1. Aufl.). München: C.H.Beck.
- Brauer, J., Xiao, Y., Poulain, T., Friederici, A. D. & Schirmer, A. (2016). Frequency of Maternal Touch Predicts Resting Activity and Connectivity of the Developing Social Brain. *Cerebral Cortex*, 26(8), 3544–3552. <https://doi.org/10.1093/cercor/bhw137>
- Bruns, H. (2000). *Am Anfang war Berührung: Kontaktimprovisation, Auswirkungen auf Körperbewußtsein, Bewegungsverhalten und musikalische Improvisation*. Norderstedt: BoD – Books on Demand.
- Bystrova, K., Ivanova, V., Edhborg, M., et al. (2009). Early Contact versus Separation: Effects on Mother-Infant Interaction One Year Later. *Birth*, 36(2), 97–109.
<https://doi.org/10.1111/j.1523-536x.2009.00307.x>
- Cascio, C. J., Moore, D. & McGlone, F. (2019). Social touch and human development. *Developmental Cognitive Neuroscience*, 35, 5–11. <https://doi.org/10.1016/j.dcn.2018.04.009>
- Ceder, E. (2019). In Support of a Safe Space in a Contact Improvisation Festival. *CQ Contact Improvisation Newsletter*, 44(2). <https://contactquarterly.com/contact-improvisation/newsletter/view/in-support-of-a-safe-space-in-a-contact-improvisation-festival#>

- Charpak, N., Ruiz, J.G., Zupan, J., et al. (2005). Kangaroo Mother Care: 25 years after. *Acta Paediatrica* 94, 514–522.
- Chateau, P.D. & Wiberg, B. (1977). Long-term effect on mother-infant behaviour of extra contact during the first hour post partum II: A follow-up at three months. *Acta Paediatrica*, 66(2), 145–151. <https://doi.org/10.1111/j.1651-2227.1977.tb07826.x>
- Chen, S. C., Yu, B. Y. M., Suen, L. K. P., Yu, J., Ho, F. Y. Y., Yang, J. J. & Yeung, W. F. (2019). Massage therapy for the treatment of attention deficit/hyperactivity disorder (ADHD) in children and adolescents: A systematic review and meta-analysis. *Complementary Therapies in Medicine*, 42, 389–399. <https://doi.org/10.1016/j.ctim.2018.12.011>
- Chugani, H. T., Behen, M. E., Muzik, O., Juhász, C., Nagy, F. & Chugani, D. C. (2001). Local Brain Functional Activity Following Early Deprivation: A Study of Postinstitutionalized Romanian Orphans. *NeuroImage*, 14(6), 1290–1301. <https://doi.org/10.1006/nimg.2001.0917>
- Cooper Albright, A. (2013). Feeling In and Out: Contact Improvisation and the Politics of Empathy. In Brandstetter, G., (Ed.), Egert, G., (Ed.) & Zubarik, S. (Ed.), *Touching and Being Touched: Kinesthesia and Empathy in Dance and Movement*, 263 -273. Berlin: De Gruyter.
- Cooper Albright, A. (2019). *How to land. Finding ground in an unstable world*. New York: Oxford University Press.
- Cox, S. (2020, October 6). *Global study links positivity about touch to lower loneliness*. Goldsmiths University of London. <https://www.gold.ac.uk/news/the-touch-test-results/>
- Crawford, J. R. & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 43(3), 245–265. <https://doi.org/10.1348/0144665031752934>
- Cruscianelli, L., Krahé C., Jenkinson P.M., Fotopoulou A. (2018). Interoceptive Ingredients of Body Ownership: Affective Touch and Cardiac Awareness in the Rubber Hand Illusion. *Cortex* 104, 180-192. <https://doi.org/10.1016/j.cortex.2017.04.018>

- Debrot, A., Schoebi, D., Perrez, M. & Horn, A. B. (2013). Touch as an Interpersonal Emotion Regulation Process in Couples' Daily Lives. *Personality and Social Psychology Bulletin*, 39(10), 1373–1385. <https://doi.org/10.1177/0146167213497592>
- De Vignemont, F., Majid, A., Jola, C., & Haggard, P. (2009). Segmenting the body into parts: evidence from biases in tactile perception. *Quarterly Journal of Experimental Psychology* 62(3), 500–512. <http://dx.doi.org/10.1080/17470210802000802>
- Diego, M. A., Field, T., Hernandez-Reif, M., Deeds, O., Ascencio, A. & Begert, G. (2007). Preterm infant massage elicits consistent increases in vagal activity and gastric motility that are associated with greater weight gain. *Acta Paediatrica*, 96(11), 1588–1591. <https://doi.org/10.1111/j.1651-2227.2007.00476.x>
- Diego, M. A., Field, T., Hernandez-Reif, M., Shaw, K., Friedman, L. & Ironson, G. (2001). HIV Adolescents Show Improved Immune Function Following Massage Therapy. *International Journal of Neuroscience*, 106(1–2), 35–45. <https://doi.org/10.3109/00207450109149736>
- Diego, M. A., Field, T., Sanders, C., & Hernandez-Reif, M. (2004). Massage therapy of moderate and light pressure and vibrator effects on EEG and heart rate. *International Journal of Neuroscience*, 114, 31–45. <https://doi.org/10.1080/00207450490249446>
- Ditzen, B., Hoppmann, C. & Klumb, P. (2008). Positive Couple Interactions and Daily Cortisol: On the Stress-Protecting Role of Intimacy. *Psychosomatic Medicine*, 70(8), 883–889. <https://doi.org/10.1097/psy.0b013e318185c4fc>
- Ditzen, B., Neumann, I. D., Bodenmann, G. et al. (2007). Effects of different kinds of couple interaction on cortisol and heart rate responses to stress in women. *Psychoneuroendocrinology*, 32(5), 565–574. <https://doi.org/10.1016/j.psyneuen.2007.03.011>
- Duhn, L. (2010). The Importance of Touch in the Development of Attachment. *Advances in Neonatal Care*, 10(6), 294–300. <https://doi.org/10.1097/anc.0b013e3181fd2263>

- Dymoke, K. (2014). Contact improvisation, the non-eroticized touch in an 'art-sport'. *Journal of Dance & Somatic Practices*, 6(2), 205-218. https://doi.org/10.1386/jdsp.6.2.205_1
- Escalona, A. (2001, October 1). *Brief Report: Improvements in the Behavior of Children with Autism Following Massage Therapy*. *Journal of Autism and Developmental Disorders*.
[https://link.springer.com/article/10.1023/A:1012273110194?error=cookies_not_supported
&code=b3571c0e-254e-445b-8372-7403ee037692](https://link.springer.com/article/10.1023/A:1012273110194?error=cookies_not_supported&code=b3571c0e-254e-445b-8372-7403ee037692)
- Essick, G. K., James, A. & McGlone, F. P. (1999). Psychophysical assessment of the affective components of non-painful touch. *NeuroReport*, 10(10), 2083–2087.
<https://doi.org/10.1097/00001756-199907130-00017>
- Essick, G. K., McGlone, F., Dancer, C., Fabricant, D., Ragin, Y., Phillips, N., Jones, T. & Guest, S. (2010). Quantitative assessment of pleasant touch. *Neuroscience & Biobehavioral Reviews*, 34(2), 192–203. <https://doi.org/10.1016/j.neubiorev.2009.02.003>
- Faul, F., Erdfelder, E., Lang, A. G. & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191. <https://doi.org/10.3758/bf03193146>
- Feldman, R., Rosenthal, Z. & Eidelman, A. I. (2014). Maternal-Preterm Skin-to-Skin Contact Enhances Child Physiologic Organization and Cognitive Control Across the First 10 Years of Life. *Biological Psychiatry*, 75(1), 56–64. <https://doi.org/10.1016/j.biopsych.2013.08.012>
- Feldman, R., Singer, M. & Zagoory, O. (2010). Touch attenuates infants' physiological reactivity to stress. *Developmental Science*, 13(2), 271–278. <https://doi.org/10.1111/j.1467-7687.2009.00890.x>
- Ferber, S. G. & Makhoul, I. R. (2004). The Effect of Skin-to-Skin Contact (Kangaroo Care) Shortly After Birth on the Neurobehavioral Responses of the Term Newborn: A Randomized, Controlled Trial. *Pediatrics*, 113(4), 858–865. <https://doi.org/10.1542/peds.113.4.858>

- Field, T. & Diego, M. (2008). Vagal activity, early growth and emotional development. *Infant Behavior and Development*, 31(3), 361–373. <https://doi.org/10.1016/j.infbeh.2007.12.008>
- Field, T., Sunshine, W., Hernandezreif, M., Quintino, O., Schanberg, S., Kuhn, C. & Burman, I. (1997a). Massage Therapy Effects on Depression and Somatic Symptoms in Chronic Fatigue Syndrome. *Journal of Chronic Fatigue Syndrome*, 3(3), 43–51. https://doi.org/10.1300/j092v03n03_03
- Field, T., Hernandez-Reif, M., Diego, M., Schanberg, S., & Kuhn, C. (2005). Cortisol decreases and serotonin and dopamine increase following massage therapy. *International Journal of Neuroscience*, 115, 1397–1413. <https://doi.org/10.1080/00207450590956459>
- Field, T., Hernandez-Reif, M., Seligmen, S., Krasnegor, J., Sunshine, W., Rivas-Chacon, R., Schanberg, S. & Kuhn, C. (1997b). Juvenile Rheumatoid Arthritis: Benefits from Massage Therapy. *Journal of Pediatric Psychology*, 22(5), 607–617. <https://doi.org/10.1093/jpepsy/22.5.607>
- Field, T., Poling, S., Mines, S., Bendell, D. & Veazey, C. (2020). Touch Deprivation and Exercise During the COVID-19 Lockdown April 2020. *Medical Research Archives*, 8(8). <https://doi.org/10.18103/mra.v8i8.2204>
- Field, T., Quintino, O., & Hernandez-Reif, M. (1998a). Adolescents with attention deficit hyperactivity disorder benefit from massage therapy. *Adolescence*, 33, 103-108.
- Field, T., Schanberg, S., Kuhn, C., Fierro, K., Henteleff, T., Mueller, C., Yando, R., Shaw, S., & Burman, I. (1998b). Bulimic adolescents benefit from massage therapy. *Adolescence*, 33, 555-565.
- Field, T.M., Schanberg, S., Scafidi, F., Brower, C., Vega-Lahr, N., Gracia, R., Nystrom, J., & Kuhn, C. (1986). Tactile/kinesthetic stimulation effects on preterm neonates. *Pediatrics* 77(5), 654-658.

Fogel, A. (2020). Three States of Embodied Self-Awareness: The Therapeutic Vitality of Restorative

Embodied Self-Awareness. *International Body Psychotherapy Journal*, 19(1), 39-49.

https://www.researchgate.net/publication/342420545_Three_States_of_Embodied_Self-Awareness_The_Therapeutic_Vitality_of_Restorative_ESA

Fox, N. A., Almas, A. N., Degnan, K. A., Nelson, C. A. & Zeanah, C. H. (2011). The effects of severe psychosocial deprivation and foster care intervention on cognitive development at 8 years of age: findings from the Bucharest Early Intervention Project. *Journal of Child Psychology and Psychiatry*, 52(9), 919–928. <https://doi.org/10.1111/j.1469-7610.2010.02355.x>

Gordon, I., Voos, A.C., Bennett, R.H., Bolling, D.Z., Pelphrey, K.A., & Kaiser, M.D., (2013). Brain mechanisms for processing affective touch. *Human Brain Mapping*, 34, 914–922. <http://dx.doi.org/10.1002/hbm.21480>

Grewen, K. M., Anderson, B. J., Girdler, S. S. & Light, K. C. (2003a). Warm Partner Contact Is Related to Lower Cardiovascular Reactivity. *Behavioral Medicine*, 29(3), 123–130. <https://doi.org/10.1080/08964280309596065>

Grewen, K. M., Anderson, B. J., Girdler, S. S., & Light, K. C. (2003b). Nonverbal encouragement of participation in a course: The effect of touching. *Social Psychology of Education*, 7, 89–98.

Grewen, K. M., Girdler, S. S., Amico, J. & Light, K. C. (2005). Effects of Partner Support on Resting Oxytocin, Cortisol, Norepinephrine, and Blood Pressure Before and After Warm Partner Contact. *Psychosomatic Medicine*, 67(4), 531–538. <https://doi.org/10.1097/01.psy.0000170341.88395.47>

Hammond, C. (2020). *Anatomy of Touch - Nine things we learned from the world's largest study of touch*. BBC Radio 4. https://www.bbc.co.uk/programmes/articles/58WGxwkrmrLclT4tcDYX4PB/nine-things-we-learned-from-the-world-s-largest-study-of-touch?fbclid=IwAR2zy_Xgfl8uJDOFvaqhoxVpTb8bukZs4kC1ntnA2S0E_Ymo1AMDn3i3H1g

- Hart, S., Field, T., Hernandez-Reif, M., Nearing, G., Shaw, S., Schanberg, S., & Kuhn, C. (2001). Anorexia Nervosa Symptoms are Reduced by Massage Therapy. *Eating Disorders*, 9(4), 289–299. <https://doi.org/10.1080/106402601753454868>
- Heinrichs, M., Baumgartner, T., Kirschbaum, C. & Ehlert, U. (2003). Social support and oxytocin interact to suppress cortisol and subjective responses to psychosocial stress. *Biological Psychiatry*, 54(12), 1389–1398. [https://doi.org/10.1016/s0006-3223\(03\)00465-7](https://doi.org/10.1016/s0006-3223(03)00465-7)
- Heinrichs, M., von Dawans, B. & Domes, G. (2009). Oxytocin, vasopressin, and human social behavior. *Frontiers in Neuroendocrinology*, 30(4), 548–557. <https://doi.org/10.1016/j.yfrne.2009.05.005>
- Hellhammer, D. H., Wüst, S. & Kudielka, B. M. (2009). Salivary cortisol as a biomarker in stress research. *Psychoneuroendocrinology*, 34(2), 163–171. <https://doi.org/10.1016/j.psyneuen.2008.10.026>
- Hernandez-Reif, M., Field, T., Ironson, G., Beutler, J., Vera, Y., Hurley, J., (...), Fraser, M. (2005). Natural killer cells and lymphocytes are increased in women with breast cancer following massage therapy. *International Journal of Neuroscience*, 115, 495–510. <https://doi.org/10.1080/00207450590523080>
- Hernandez-Reif, M., Field, T., Krasnegor, J., & Burman, I. (2000). High blood pressure and associated symptoms were reduced by massage therapy. *Journal of Bodywork and Movement Therapies*, 4, 31–38.
- Hernandez-Reif, M., Field, T., Theakston, H. (1998). Multiple sclerosis patients benefit from massage therapy. *Journal of bodywork and movement therapies* 2(3), 168-174. [https://doi.org/10.1016/S1360-8592\(98\)80009-0](https://doi.org/10.1016/S1360-8592(98)80009-0)

- Hernandez-Reif, M., Ironson, G., Field, T., Hurley, J., Katz, G., Diego, M., (...), Burman, I. (2004). Breast cancer patients have improved immune and neuroendocrine functions following massage therapy. *Journal of Psychosomatic Research*, 57(1), 45–52. [https://doi.org/10.1016/s0022-3999\(03\)00500-2](https://doi.org/10.1016/s0022-3999(03)00500-2)
- Himberg, T., Laroche, J., Bigé, R., Buchkowski, M. & Bachrach, A. (2018). Coordinated Interpersonal Behaviour in Collective Dance Improvisation: The Aesthetics of Kinaesthetic Togetherness. *Behavioral Sciences*, 8(2), 23. <https://doi.org/10.3390/bs8020023>
- Holt-Lunstad, J., Birmingham, W. A. & Light, K. C. (2008). Influence of a “Warm Touch” Support Enhancement Intervention Among Married Couples on Ambulatory Blood Pressure, Oxytocin, Alpha Amylase, and Cortisol. *Psychosomatic Medicine*, 70(9), 976–985. <https://doi.org/10.1097/psy.0b013e318187aef7>
- Houston, S. (2009). The touch ‘taboo’ and the art of contact: an exploration of Contact Improvisation for prisoners. *Research in Dance Education*, 10(2), 97–113. <https://doi.org/10.1080/14647890903019432>
- IJzerman, H., Gallucci, M., Pouw, W. T., Weißgerber, S. C., Van Doesum, N. J. & Williams, K. D. (2012). Cold-blooded loneliness: Social exclusion leads to lower skin temperatures. *Acta Psychologica*, 140(3), 283–288. <https://doi.org/10.1016/j.actpsy.2012.05.002>
- Ironson, G., Field, T., Scafidi, F., Hashimoto, M., Kumar, M., Kumar, A., (...), Fletcher, M. A. (1996). Massage Therapy is Associated with Enhancement of the Immune System’s Cytotoxic Capacity. *International Journal of Neuroscience*, 84(1–4), 205–217. <https://doi.org/10.3109/00207459608987266>
- Jakubiak, B. K. & Feeney, B. C. (2016). Affectionate Touch to Promote Relational, Psychological, and Physical Well-Being in Adulthood: A Theoretical Model and Review of the Research. *Personality and Social Psychology Review*, 21(3), 228–252. <https://doi.org/10.1177/1088868316650307>

- Janke, S. & Glöckner-Rist, A. (2014). *Deutsche Version der Positive and Negative Affect Schedule (PANAS)*. gesis Leibniz-Institut für Sozialwissenschaften. <https://doi.org/10.6102/zis146>
- Jenkinson, P. M., Papadaki, C., Besharati, S., Moro, V., Gobetto, V., Crucianelli, L., (...), Fotopoulou, A. (2020). Welcoming back my arm: affective touch increases body ownership following right-hemisphere stroke. *Brain Communications*, 2(1).
<https://doi.org/10.1093/braincomms/fcaa034>
- Jola, C. (2020). Empirical Research in an Embodied Practice: Can the Study of Partnering Touch, Touch on Something New? In Sarco-Thomas, M. (Ed.), *Thinking Touch in Partnering and Contact Improvisation. Philosophy, Pedagogy, Practice*, 52-81. Newcastle upon Tyne: Cambridge Scholars Publishing.
- Jones, N., & Field, T. (1999). Massage and music therapies attenuate frontal EEG asymmetry in depressed adolescents. *Adolescence*, 34, 534–539.
- Jussilainen, A. (2015). Contact improvisation as an art of relating: The importance of touch for building positive interaction. *Journal of Dance & Somatic Practices* 7(1), 113-127. [https://doi: 10.1386/jdsp.7.1.113_1](https://doi.org/10.1386/jdsp.7.1.113_1)
- Keogh, M. (2018). *Dancing deeper still. The Practice of Contact Improvisation*. Intimately Rooted Books
- Kida, T. & Shinohara, K. (2013). Gentle touch activates the prefrontal cortex in infancy: An NIRS study. *Neuroscience Letters*, 541, 63–66. <https://doi.org/10.1016/j.neulet.2013.01.048>
- Kimmel, M., Hristova, D., & Kussmaul, K. (2018). Sources of Embodied Creativity: Interactivity and Ideation in Contact Improvisation. *Behavioural Sciences* 8, 52. Doi: 10.3390/bs8060052
- Leary, M. R. & Buttermore, N. R. (2003). The Evolution of the Human Self: Tracing the Natural History of Self-Awareness. *Journal for the Theory of Social Behaviour*, 33(4), 365–404.
<https://doi.org/10.1046/j.1468-5914.2003.00223.x>

Lemmer Schmid, J. (2020, August 4). *CI, Mindfulness and Flow Experience*. Researchgate.

https://www.researchgate.net/publication/343425222_CI_Mindfulness_Flow-Experience

lenk3rad. (2014). *...in a non-wimpy way*. [Video]. Vimeo. <https://vimeo.com/76095626>

Light, K. C., Grewen, K. M. & Amico, J. A. (2005). More frequent partner hugs and higher oxytocin levels are linked to lower blood pressure and heart rate in premenopausal women. *Biological Psychology*, 69(1), 5–21. <https://doi.org/10.1016/j.biopsycho.2004.11.002>

Liljencrantz J., & Olausson, H. (2014). Tactile C fibers and their contributions to pleasant sensations and to tactile allodynia. *Frontiers in Behavioral Neuroscience* 8, article 37. <https://doi:10.3389/fnbeh.2014.00037>

Little, N. (2014). Restructuring the self-sensing: Attention training in contact improvisation. *Journal of Dance & Somatic Practices*, 6(2), 247–260. https://doi.org/10.1386/jdsp.6.2.247_1

Liu, X., Vitetta, L., Kostner, K., Crompton, D., Williams, G., Brown, W.J., (...), Whiteford, H. (2015). The Effects of Tai Chi in Centrally Obese Adults with Depression Symptoms. Evidence-Based *Complementary and Alternative Medicine* 2015, article 879712. <http://dx.doi.org/10.1155/2015/879712>

Löken, L.S., Wessberg, J., Morrison, I., McGlone, F., & Olausson, H. (2009). Coding of pleasant touch by unmyelinated afferents in humans. *Nature Neuroscience* 12(5), 547–548. <http://dx.doi.org/10.1038/nn.2312>

MacLean, K. (2003). The impact of institutionalization on child development. *Development and Psychopathology*, 15(4), 853–884. <https://doi.org/10.1017/s0954579403000415>

Marchant, D., Sylvester J.L., & Earhart, G.M. (2010). Effects of a short duration, high dose contact improvisation dance workshop on Parkinson disease: A pilot study. *Complementary Therapies in Medicine* 18, 184-190. DOI: 10.1016/j.ctim.2010.07.004

- Mazzaglia, R. (2013). Words as a living source of documentation: An introduction to Steve Paxton's account on contact improvisation. *Danza e Ricerca. Laboratorio di studi, scritture, visioni* 4, 251-280.
https://www.academia.edu/8991755/Words_as_a_living_source_of_documentation_An_introduction_to_Steve_Paxton_s_account_on_contact_improvisation
- Montagu, A. (1978). *Touching: The Human Significance of the Skin*. New York and London: Harper and Row.
- Morhenn, V. B., Beavin, L. E. & Zak, P. J. (2012). Massage increases oxytocin and reduces adrenocorticotropin hormone in humans. *Alternative therapies in health and medicine*, 18(6), 11–18.
- Morrison, I., Bjornsdotter, M. & Olausson, H. (2011). Vicarious Responses to Social Touch in Posterior Insular Cortex Are Tuned to Pleasant Caressing Speeds. *Journal of Neuroscience*, 31(26), 9554–9562. <https://doi.org/10.1523/jneurosci.0397-11.2011>
- Morrison, I., Keep Calm and Cuddle on (2016). Social touch as a stress buffer. *Adaptive Human Behavior and Physiology* 2, 344–362. <https://doi.org/10.1007/s40750-016-0052-x>
- Nelson, C. A. (2007). A Neurobiological Perspective on Early Human Deprivation. *Child Development Perspectives*, 1(1), 13–18. <https://doi.org/10.1111/j.1750-8606.2007.00004.x>
- Novack, C. J. (1990). *Novack, C: Sharing the Dance: Contact Improvisation and American Culture (New Directions in Anthropological Writing)*. Wisconsin: The University of Wisconsin Press.
- Nummenmaa, L., Tuominen, L., Dunbar, R., Hirvonen, J., Manninen, S., Arponen, E., (...), Sams, M. (2016). Social touch modulates endogenous μ -opioid system activity in humans. *NeuroImage*, 138, 242–247. <https://doi.org/10.1016/j.neuroimage.2016.05.063>
- Olausson, H., Lamarre, Y., Backlund, H., Morin, C., Wallin, B., Starck, G., (...), Bushnell, M. (2002). Unmyelinated tactile afferents signal touch and project to insular cortex. *Nature Neuroscience*, 5(9), 900–904. <https://doi.org/10.1038/nn896>

- Olausson, H., Wessberg, J., Morrison, I., McGlone, F. & Vallbo, K. (2010). The neurophysiology of unmyelinated tactile afferents. *Neuroscience & Biobehavioral Reviews*, 34(2), 185–191.
<https://doi.org/10.1016/j.neubiorev.2008.09.011>
- Pallant, C. (2006). *Contact Improvisation. An Introduction to a Vitalizing Dance Form*. Jefferson, North Carolina: McFarland & Company.
- Pallant, C. (2020, December 24). *Flashback: Interview with Nancy Stark Smith April 2002*.
<https://contactquarterly.com/cq/unbound/index.php#view=flashback-interview-with-nancy-stark-smith>
- Pawling, R., Cannon, P. R., McGlone, F. P., & Walker, S. C. (2017). C-tactile afferent stimulating touch carries a positive affective value. *PLOS ONE*, 12(3), e0173457.
<https://doi.org/10.1371/journal.pone.0173457>
- Paxton, S., Kilcoyne, A., & Mount, K. (1993). On the Braille in the Body: An Account of the Touchdown Dance Integrated Workshops with the Visually Impaired and the Sighted. *Dance Research: The Journal of the Society for Dance Research* 11(1), 3-51.
<https://www.jstor.org/stable/1290603>
- Payne, P., Levine, P.A, & Crane-Godreau, M.A. (2015). Somatic experiencing: Using interoception and proprioception as core elements of trauma therapy. *Frontiers in Psychology*, 6, article 93.
<https://doi.org/10.3389/fpsyg.2015.00093>
- Porges, S. W. (2001). The polyvagal theory: Phylogenetic substrates of a social nervous system. *Psychoneuroendocrinology*, 23, 837–861.
- Post-White, J., Fitzgerald, M., Savik, K., Hooke, M. C., Hannahan, A. B. & Sencer, S. F. (2008). Massage Therapy for Children With Cancer. *Journal of Pediatric Oncology Nursing*, 26(1), 16–28.
<https://doi.org/10.1177/1043454208323295>

Pourian, H. (2016). *Eine berührbare Welt. Contact Improvisation als gesellschaftsbewegende Kultur.*

Dresden: contact bewegen e.V.

https://beruehrbarewelt.de/pdf_download_book/eineber%C3%BChrbarewelt_heikepourian_1auflage_ansicht.pdf

Pourian, H. (2021). *Wenn wir wieder wahrnehmen. Wach und spürend den Krisen unserer Zeit begegnen.* Waldkappel: Ideen³ e.V.

Punyanunt-Carter, N. M., & Wrench, J. S. (2009). Development and validity testing of a measure of touch deprivation. *Human Communication, 12*(1), 67–76.

Reddy, J. S. K., Roy, S., De Souza Leite, E. & Pereira Jr, A. (2019). The ‘Self’ Aspects: The Sense of the Existence, Identification, and Location. *Integrative Psychological and Behavioral Science, 53*(3), 463–483. <https://doi.org/10.1007/s12124-019-9476-8>

Rossi, V. & Pourtois, G. (2012). Transient state-dependent fluctuations in anxiety measured using STAI, POMS, PANAS or VAS: a comparative review. *Anxiety, Stress & Coping, 25*(6), 603–645. <https://doi.org/10.1080/10615806.2011.582948>

Russell, N. C., Sumler, S. S., Beinhorn, C. M., & Frenkel, M. A. (2008). Role of massage therapy in cancer care. *Journal of Alternative and Complementary Medicine, 14*, 209–214.

Sarco-Thomas, M., & Zammit, R. (2020). Contact improvisation and the Health Sciences. In *Thinking Touch in Partnering and Contact Improvisation. Philosophy, Pedagogy, Practice*, Sarco-Thomas, M. (Ed.), 82-103. Newcastle upon Tyne: Cambridge Scholars Publishing.

Scafidi, F. A., Field, T. M., Schanberg, S. M., Bauer, C. R., Tucci, K., Roberts, J., (...), Kuhn, C. M. (1990). Massage stimulates growth in preterm infants: A replication. *Infant Behavior and Development, 13*(2), 167–188. [https://doi.org/10.1016/0163-6383\(90\)90029-8](https://doi.org/10.1016/0163-6383(90)90029-8)

Stark Smith, N. (2006). Harvest. One History of Contact Improvisation. *Contact Quarterly, 31*(2), 46-54. <https://contactquarterly.com/cq/unbound/view/harvest-a-history-of-ci#>

- Stern, D. N. (1985). *The Interpersonal World of the Infant. A View from Psychoanalysis and Developmental Psychology*. New York: Basic Books.
- Tabachnick, B. G., & Fidell, L.S. (2019). *Using Multivariate Statistics, 7th Edition*.
<https://www.pearson.com/us/higher-education/program/Tabachnick-Using-Multivariate-Statistics-7th-Edition/PGM2458367.html>
- Teixeira, A.M., Ferreira, J.P., Hogervorst E., Braga, M.F., Bandelow S., Rama L., (...), Pedrosa, F.M. (2016). Study Protocol on Hormonal Mediation of Exercise on Cognition, Stress and Immunity (PRO-HMECSI): Effects of Different Exercise Programmes in Institutionalized Elders. *Frontiers in Public Health*, 4, article 133. <https://doi.org/10.3389/fpubh.2016.00133>
- Tsuji, S., Yuhi, T., Furuhashi, K., Ohta, S., Shimizu, Y. & Higashida, H. (2015). Salivary Oxytocin Concentrations in Seven Boys with Autism Spectrum Disorder Received Massage from Their Mothers: A Pilot Study. *Frontiers in Psychiatry*, 6. <https://doi.org/10.3389/fpsy.2015.00058>
- Uvnäs-Moberg, K. & Petersson, M. (2005). Oxytocin, ein Vermittler von Antistress, Wohlbefinden, sozialer Interaktion, Wachstum und Heilung/ Oxytocin, a mediator of anti-stress, well-being, social interaction, growth and healing. *Zeitschrift für Psychosomatische Medizin und Psychotherapie*, 51(1), 57–80. <https://doi.org/10.13109/zptm.2005.51.1.57>
- Van der Kolk, B. (2018). *Verkörperter Schrecken. Traumaspuren in Gehirn, Geist und Körper und wie man sie heilen kann* (5.Auflage). Lichtenau/Westfalen: G.P. Probst Verlag
- Von Mohr, M., Kirsch, L. P. & Fotopoulou, A. (2017). The soothing function of touch: affective touch reduces feelings of social exclusion. *Scientific Reports*, 7(1), article 13516.
<https://doi.org/10.1038/s41598-017-13355-7>
- Weir, K. (2014). The lasting impact of neglect. *Monitor of psychology* 45(6), 36-43.
<https://www.apa.org/monitor/2014/06/neglect>

- Weiss, S. J., Wilson, P., Seed, M. S. J. & Paul, S. M. (2001). Early tactile experience of low birth weight children: links to later mental health and social adaptation. *Infant and Child Development*, 10(3), 93–115. <https://doi.org/10.1002/icd.236>
- Williams, B.M. (2019). *Nuances of touch: Embodying and communicating nonverbal consent in contact improvisation*. Master Thesis. University of British Columbia, Vancouver.
- Williams, L. E. & Bargh, J. A. (2008). Experiencing Physical Warmth Promotes Interpersonal Warmth. *Science*, 322, 606–607. <https://doi.org/10.1126/science.1162548>
- Winberg, J. (2005). Mother and newborn baby: mutual regulation of physiology and behavior: a selective review. *Developmental Psychobiology*. 47(3), 217-229. <https://doi.org/10.1002/dev.20094>
- Zschuke, E., Rennenberg, B., Dimeo, F., Wüstenberg, T. & Ströhle, A. (2015). The Stress-buffering effect of acute exercise: Evidence for HPA axis negative feedback. *Psychoneuroendocrinology*, 51, 414–425. <http://dx.doi.org/10.1016/j.psyneuen.2014.10.019>

Appendix

Table 1

(...)

Figure 1

Positive Experiences Mentioned in the Interviews

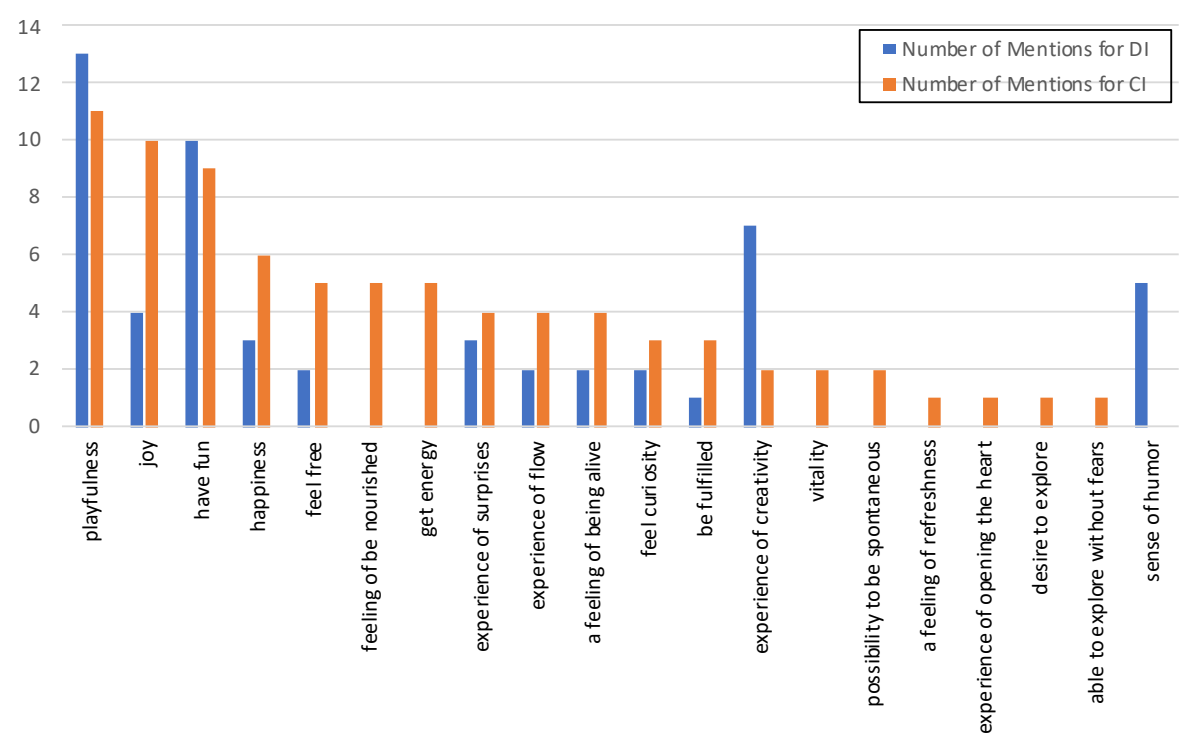


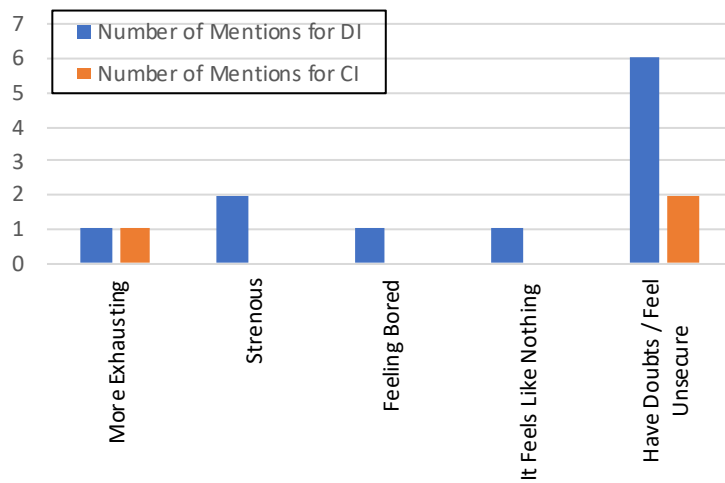
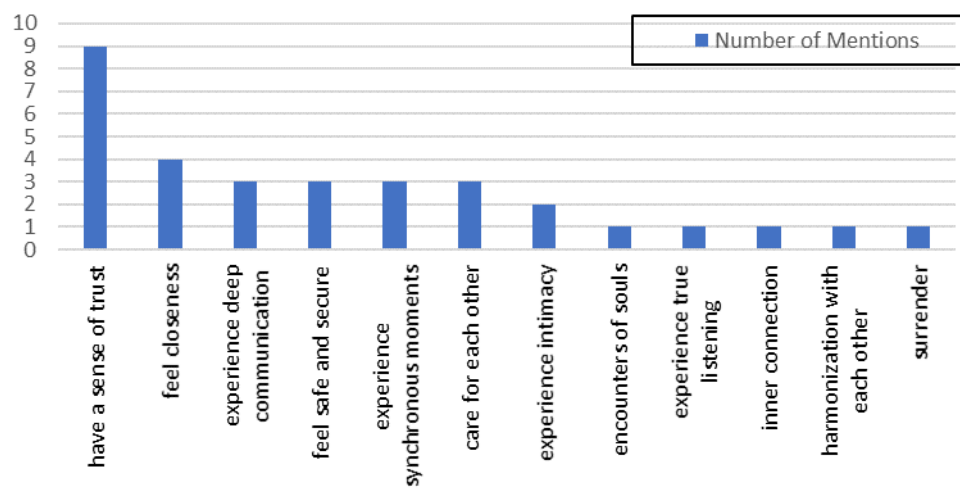
Figure 2*Negative Experiences Mentioned in the Interviews***Figure 3***Aspects of Sense of Connectedness in CI Mentioned in the Interviews*

Figure 3

Expressions about Less Stress Mentioned in the Interview

