



UNIVERSITY OF  
LIVERPOOL

**An exploration of interpersonal touch in relation to mental health difficulties**

Victoria Tinker

Supervisors:

Dr Charlotte Krahé

Dr Paula Trotter

Expert by Experience (for Chapter II):

George Loughlin

Submitted in partial fulfilment of the Doctorate in Clinical Psychology  
University of Liverpool

Version 1: June 2022

Version 2: August 2022

## **Acknowledgements**

I would like to take this opportunity to acknowledge and thank people who have helped and supported me in completing this thesis.

I would like to thank all the participants who took part in my empirical study, I appreciate and value your participation. Thank you to my amazing supervisors, Dr Charlotte Krahé and Dr Paula Trotter. Charlotte, I cannot express enough how much your unwavering support, patience and guidance over the last three years kept me going. You believed in me during times when I struggled to believe in myself and your compassion and faith in me kept me contained throughout. Your kind, encouraging words will always stay with me. Paula, thank you for always being available at what seemed like the drop of a hat. Your patience and guidance through this process has helped me navigate a very daunting time and I appreciate everything you have taught me. Massive thanks to the SomAffect group for welcoming me into their forum to share my research. Their expertise and feedback were invaluable to me.

Words probably won't do justice to how appreciative I am for the support and love from my family and friends. Thank you so much to my fellow trainees Kate, Tom and Fran for being there every stage of this thesis, through the tears and the laughter, of which there were many! Thank you to all my friends on the course who have been there to ground me, to listen and to share in the joys and struggles over the last three years. Thank you to all my cherished friends outside of the doctorate. For your understanding and patience over the last three years.

Finally, thank you to my incredible family. Mum, Dad, Beth and Pip, you are my biggest cheerleaders and not a day goes by where I don't feel appreciative of the love and closeness we share. It has got me through some difficult times during the last three years, the most recent months especially. I will always endeavour to make you proud and look forward to celebrating with you when I finally graduate.

## Table of Contents

<b><i>Introductory Chapter</i></b> .....	<b>1</b>
<b><i>Introductory Chapter References</i></b> .....	<b>3</b>
<b><i>Chapter I: Systematic Review</i></b> .....	<b>7</b>
<b><i>The effects of touch-based interventions on anxiety and depression: A Systematic Review</i></b>	<b>7</b>
<b><i>Abstract</i></b> .....	<b>8</b>
<b>Background</b> .....	<b>8</b>
<b>Method</b> .....	<b>8</b>
<b>Results</b> .....	<b>8</b>
<b>Conclusion</b> .....	<b>9</b>
<b><i>Introduction</i></b> .....	<b>10</b>
<b>Rationale and Objectives for this Review</b> .....	<b>13</b>
<b><i>Method</i></b> .....	<b>14</b>
<b>Searches and Screening</b> .....	<b>14</b>
<b>Eligibility Criteria</b> .....	<b>15</b>
<b>Data Extraction</b> .....	<b>16</b>
<b>Quality Assessment</b> .....	<b>16</b>
<b><i>Results</i></b> .....	<b>17</b>
<b>Study Characteristics</b> .....	<b>17</b>
<b>Quality Assessment</b> .....	<b>26</b>
<b>Study Findings</b> .....	<b>31</b>
<b>Depression</b> .....	<b>31</b>
<b>Anxiety</b> .....	<b>34</b>
<b><i>Discussion</i></b> .....	<b>43</b>
<b>Implications on Research and Practice</b> .....	<b>43</b>
<b>Limitations and Direction for Future Research</b> .....	<b>44</b>
<b><i>Conclusion</i></b> .....	<b>48</b>
<b><i>Chapter I References</i></b> .....	<b>50</b>
<b><i>Chapter II: Empirical</i></b> .....	<b>62</b>
<b><i>The association between depressive symptoms and perceptions and attitudes to social touch</i></b> .....	<b>62</b>
<b><i>Abstract</i></b> .....	<b>63</b>

Background .....	63
Method.....	63
Results.....	64
Conclusion.....	64
<b><i>Introduction.....</i></b>	<b>65</b>
<b><i>Method.....</i></b>	<b>71</b>
Design.....	71
Sample size and characteristics .....	71
Measures and Materials.....	72
Data analysis plan .....	74
Procedure.....	75
<b><i>Results.....</i></b>	<b>76</b>
Data Analysis.....	76
Descriptive statistics .....	76
Correlations .....	78
The influence of depressive symptoms on perception of affective touch.....	79
Examining the association between touch longing and depressive symptoms.....	81
<b><i>Discussion.....</i></b>	<b>82</b>
Limitations and Future Research.....	85
Conclusion.....	86
<b><i>Chapter II References.....</i></b>	<b>88</b>
<b><i>Appendix 1: Appendices for Chapter I.....</i></b>	<b>98</b>
<b><i>Appendix 2: Appendices for Chapter II.....</i></b>	<b>107</b>

**Word count:** 18, 932 words

## Introductory Chapter

“Nothing eases suffering like human touch” - Bobby Fischer

The sense of touch is one of the first senses humans develop (Ward Platt, 2006). It connects us to our physical environment and allows us to explore and learn from our surroundings, whilst being receptive to changes in temperature, texture, pressure and speed (Jones, 2016; Lederman, 1982; O’Shaughnessy, 1989). Tactile input is detected by receptors on the skin, transmitting that information via the central nervous system for final reception by the brain (Abraira & Ginty, 2013).

In addition to our physical environment, touch also connects us to our social environment, defined by the interpersonal and social connections we make. In the context of our social environment, touch is a form of non-verbal communication with a role to facilitate communication of emotions, social bonding, attachments and intimacy (Hertenstein et al., 2006). A specific type of touch, linked to social bonding and social connection, is called affective touch. Affective touch is a slow, gentle, stroke-like motion that activates specific C-tactile (CT) afferents on hairy skin (Nordin, 1990). Activation of the CT afferents is associated with greater perceived pleasantness of touch (Löken et al., 2009).

Experiences and attitudes to touch can vary and are influenced by past experiences, such as how much physical affection was given in childhood, and current experiences, such as touch from friends and family (Trotter et al., 2018). The perception of touch, regarding how pleasant it is perceived, also varies and will be influenced by experiences of touch. For example, individuals with low exposure to touch, rate touch as less pleasant (Sailer & Ackerley, 2019) and individuals with anxious attachment styles, rate touch as less pleasant (Krahé et al., 2018). Other factors can influence the perception of touch, such as mental health difficulties. For example, individuals with anorexia or autism, perceive touch as less pleasant (Croy et al., 2016; Crucianelli et al., 2016).

Despite differences in perception of touch, the therapeutic benefits of it have been widely reported. Social touch has been shown to buffer stress and produce calming effects (Morrison, 2016). Affective touch specifically has also been shown to produce calming effects through decreased heart rate, in infants and adults (Fairhurst et al., 2014; Pawling et al., 2017; Triscoli et al., 2017). Interpersonal touch, in the form of massage therapy, has been shown to yield therapeutic benefits such as a reduction in pain, distress, aggression and stress (Diego et al., 2002; Hernandez-Reif et al., 1998; Hernandez-Reif et al., 2001). Within a mental health setting, touch has been shown to be reassuring, comforting and increase social connection between nurses and clients (Gleeson & Higgins, 2009). Ethics of touch and the use of touch in mental health settings need to be considered, for example how this impacts the power dynamics within a therapeutic relationship, specifically considering whether the use of touch is clinically appropriate, how touch may be interpreted by a client and the potential for sexual exploitation of clients (Zur, 2007).

Depression and anxiety are common mental health difficulties that have been shown to benefit from touch. Field (2002) concluded that individuals with greater intimacy with their parents had lower depression scores and individuals with less intimacy with their parents had higher depression scores. Massage therapy has already been shown to reduce depression through decreases in cortisol and serotonin levels, and increased dopamine levels (Field et al., 2005) and reduce anxiety through decreases in salivary cortisol (Field et al., 1996). The evidence of positive effects of touch in common mental health difficulties could be used to inform treatment and intervention.

This thesis explores interpersonal touch in relation to mental health difficulties. Chapter I is a systematic review of the literature around touch-based interventions for anxiety and depression. The review aims to provide an updated synthesis of the impact of massage therapy on anxiety and/or depression, and the direction of this relationship. Chapter II provides an empirical study exploring the association between depressive symptoms and the

perception of affective touch. This study was conducted online and used videos depicting social touch to evaluate the impact of depressive symptoms on perceived pleasantness of social touch.

The information in the two chapters is supplemented by material in the appendices for purpose of examination.

## Introductory Chapter References

Abraira, V., & Ginty, D. (2013). The Sensory Neurons of Touch. *Neuron*, 79(4), 618–639.

<https://doi.org/10.1016/j.neuron.2013.07.051>

Croy, I., Geide, H., Paulus, M., Weidner, K., & Olausson, H. (2016). Affective touch awareness in mental health and disease relates to autistic traits – An explorative neurophysiological investigation. *Psychiatry Research*, 245, 491–496.

<https://doi.org/10.1016/j.psychres.2016.09.011>

Crucianelli, L., Cardi, V., Treasure, J., Jenkinson, P. M., & Fotopoulou, A. (2016). The perception of affective touch in anorexia nervosa. *Psychiatry Research*, 239, 72–78.

<https://doi.org/10.1016/j.psychres.2016.01.078>

Diego, M. A., Field, T., Hernandez-Reif, M., Shaw, J. A., Rothe, E. M., Castellanos, D., & Mesner, L. (2002). Aggressive adolescents benefit from massage therapy.

*Adolescence*, 37, 597–607.

Fairhurst, M. T., Löken, L., & Grossmann, T. (2014). Physiological and Behavioral Responses Reveal 9-Month-Old Infants' Sensitivity to Pleasant Touch. *Psychological Science*, 25(5), 1124–1131. <https://doi.org/10.1177/0956797614527114>

*Science*, 25(5), 1124–1131. <https://doi.org/10.1177/0956797614527114>

Field, T. (2002). Massage therapy. *Medical Clinics of North America*, 86(1), 163–171.

[https://doi.org/10.1016/s0025-7125\(03\)00078-6](https://doi.org/10.1016/s0025-7125(03)00078-6)

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(10), 1397–1413.

<https://doi.org/10.1080/00207450590956459>

Field, T., Ironson, G., Scafidi, F., Nawrocki, T., Goncalves, A., Burman, I., Pickens, J., Fox, N., Schanberg, S., & Kuhn, C. (1996). Massage Therapy Reduces Anxiety and

Enhances EEG Pattern of Alertness and Math Computations. *International Journal of Neuroscience*, 86(3–4), 197–205. <https://doi.org/10.3109/00207459608986710>

Gleeson, M., & Higgins, A. (2009). Touch in mental health nursing: an exploratory study of nurses views and perceptions. *Journal of Psychiatric and Mental Health Nursing*, 16(4), 382–389. <https://doi.org/10.1111/j.1365-2850.2009.01389.x>

Hernandez-Reif, M., Dieter, J., Field, T., Swerdlow, B., & Diego, M. (1998). Migraine Headaches are Reduced by Massage Therapy. *International Journal of Neuroscience*, 96(1–2), 1–11. <https://doi.org/10.3109/00207459808986453>

Hernandez-Reif, M., Field, T., Krasnegor, J., & Theakston, H. (2001). Lower Back Pain is Reduced and Range of Motion Increased After Massage Therapy. *International Journal of Neuroscience*, 106(3–4), 131–145. <https://doi.org/10.3109/00207450109149744>

Hertenstein, M. J., Verkamp, J. M., Kerestes, A. M., & Holmes, R. M. (2006). The Communicative Functions of Touch in Humans, Nonhuman Primates, and Rats: A Review and Synthesis of the Empirical Research. *Genetic, Social, and General Psychology Monographs*, 132(1), 5–94. <https://doi.org/10.3200/mono.132.1.5-94>

Jones, L. (2016). Thermal Touch. In *Scholarpedia of Touch: Prescott, T., Ahissar, E., Izhikevich, E. (eds)* (pp. 257–262). Atlantis Press. [https://doi.org/10.2991/978-94-6239-133-8\\_21](https://doi.org/10.2991/978-94-6239-133-8_21)

Krahé, C., von Mohr, M., Gentsch, A., Guy, L., Vari, C., Nolte, T., & Fotopoulou, A. (2018). Sensitivity to CT-optimal, Affective Touch Depends on Adult Attachment Style. *Scientific Reports*, 8(1), 1–10. <https://doi.org/10.1038/s41598-018-32865-6>

Lederman, S. J. (1982). *The perception of texture by touch. Tactual perception. A sourcebook.*

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. <https://doi.org/10.1038/nn.2312>
- Morrison, I. (2016). Keep Calm and Cuddle on: Social Touch as a Stress Buffer. *Adaptive Human Behavior and Physiology*, 2(4), 344–362. <https://doi.org/10.1007/s40750-016-0052-x>
- Nordin, M. (1990). Low-threshold mechanoreceptive and nociceptive units with unmyelinated (C) fibres in the human supraorbital nerve. *The Journal of Physiology*, 426(1), 229–240. <https://doi.org/10.1113/jphysiol.1990.sp018135>
- O’Shaughnessy, B. (1989). The sense of touch. *Australasian Journal of Philosophy*, 67(1), 37–58. <https://doi.org/10.1080/00048408912343671>
- Pawling, R., McGlone, F., Walker, S., & Cannon, P. (2017). C-tactile afferent stimulating touch carries a positive affective value. *PLoS ONE*, 12(3). <https://doi.org/10.1371/journal.pone.0173457>
- Sailer, U., & Ackerley, R. (2019). Exposure shapes the perception of affective touch. *Developmental Cognitive Neuroscience*, 35(August 2017), 109–114. <https://doi.org/10.1016/j.dcn.2017.07.008>
- Tricoli, C., Olausson, H., Croy, I., & Sailer, U. (2017). Touch between romantic partners: Being stroked is more pleasant than stroking and decelerates heart rate. *Physiology and Behavior*, 177. <https://doi.org/10.1016/j.physbeh.2017.05.006>
- Trotter, P. D., McGlone, F., Reniers, R. L. E. P., & Deakin, J. F. W. (2018). Construction and Validation of the Touch Experiences and Attitudes Questionnaire (TEAQ): A Self-report Measure to Determine Attitudes Toward and Experiences of Positive Touch. In *Journal of Nonverbal Behavior* (Vol. 42, Issue 4). Springer US. <https://doi.org/10.1007/s10919-018-0281-8>
- Ward Platt, M. (2006). *The Wonder Years, The essential guide to child development for ages 0-5*.
- Zur, O. (2007). Touch in therapy and the standard of care in psychotherapy and counselling: Bringing clarity to illusive relationships. *US Association of Body Psychotherapy Journal*

An exploration of interpersonal touch in relation to mental health difficulties

6, 61, 93.

## **Chapter I: Systematic Review**

The effects of touch-based interventions on anxiety and depression: A  
Systematic Review

## **Abstract**

### **Background**

Depression and anxiety are common mental health disorders with a significant overlap of symptoms and comorbidity of diagnosis. The current recommended treatment in the UK for major depressive disorder in adults is prescription of antidepressants and a psychological treatment and for generalised anxiety disorder, self-help, or a group course. Massage therapy is a popular form of complementary and alternative medicines (CAM), involving touch-based techniques such as stroking, vibration, holding, and pressing. Existing evidence, and previous reviews, indicate that massage therapy is effective in reducing symptoms of anxiety and depression for children, adults and older adults. This review aimed to provide an updated synthesis on the research exploring the impact of touch-based interventions on anxiety and depression.

### **Method**

Searches of ProQuest (PsycINFO and Medline), PubMed and Web of Science for English language, empirical studies included descriptors for touch-based interventions, anxiety and depression. For inclusion in the review, studies were required to quantitatively evaluate the effects of a touch-based intervention for anxiety and depression, and their clinical counterparts MDD and GAD, administered by another adult, using validated measures of anxiety or depression.

### **Results**

N = 14 studies met the inclusion criteria and were reviewed. Thirteen studies showed a significant effect of touch-based intervention in reducing anxiety and/or depression within clinical (GAD and MDD) and/or non-clinical samples. The efficacy of massage therapy increases, for depression, when techniques to increase body awareness are combined with the touch-based intervention and, for anxiety, when energy-based interventions are

incorporated in massage therapy. The studies varied in study design and populations were heterogenous.

## **Conclusion**

Massage therapy is effective in reducing symptoms of anxiety and/or depression, in clinical (GAD, MDD) and non-clinical populations. Future studies require larger homogenous samples and the use of randomised methods in which there are numerous treatment groups to address limitations of blinding.

## Introduction

Depression and anxiety are common mental health disorders experienced by up to 15% of the population at one time (National Institute for Health and Care Excellence; NICE, 2011). Between 1990 and 2013, the number of cases worldwide of individuals with symptoms of depression and/or anxiety increased by almost 50% from 416 million to 615 million (World Health Organisation; WHO, 2016). Individuals experiencing depression and anxiety disorders can struggle with relapse and remission throughout their lifetime and there are significant long-term effects associated with these disorders for some individuals (NICE, 2011). For example, approximately 90% of people dying by suicide have a psychiatric disorder, with depression being the most common disorder, found in at least 60% of cases (Centre for Suicide Research, 2022). Moreover, Major Depressive Disorder (MDD) is most commonly associated with suicide with individuals with a diagnosis of MDD having a 20 times greater increased risk of suicide than the general population (Borentain et al., 2020).

The main symptoms of depression include low mood, loss of interest and pleasure in everyday activities, feelings of worthlessness and suicidal thoughts (Diagnostic and Statistical Manual of Mental Disorders: Fifth Edition, DSM-V, American Psychiatric Association [APA], 2013). The main symptoms of anxiety include excessive fear and uncontrollable worry, irritability and feeling on edge (APA, 2013). There are varying presentations for both depressive and anxiety disorders, however, APA (2013) indicates an overlap in symptoms such as fatigue, sleep disturbance, restlessness, and lack of concentration. This diagnostic overlap is particularly evident for MDD and Generalised Anxiety Disorder (GAD) which has been explored, and confirmed, in research (Goodwin, 2015; Shin, 2020; Zbozinek et al., 2012). Unsurprisingly, these disorders are shown to have extensive comorbidity (Brown et al., 2001; Kessler et al., 2007).

The current recommended treatment for MDD in adults in the UK is prescription of antidepressants and a psychological treatment, either cognitive behavioural therapy (CBT) or interpersonal therapy (National Institute for Health and Care Excellence, 2009). There is,

overall, a preference for psychological treatment over medication for individuals receiving treatment for depression (McHugh et al., 2013). The current evidence base suggests that CBT is effective in the treatment of depression (Lepping et al., 2017; López-López et al., 2019). Interpersonal therapy has also shown to be effective and more effective than CBT (de Mello et al., 2004). The current recommended treatment for GAD in the UK initially is self-help or a group course (National Institute for Health and Care Excellence, 2011b). If this is not effective, NICE (2011) recommend psychological treatment such as CBT, applied relaxation or psychiatric intervention of medication. A meta-analysis exploring psychological treatments for GAD concluded that CBT was an effective treatment of GAD (Cuijpers et al., 2014). There was limited data to draw upon regarding the efficacy of applied relaxation, however those that did find that CBT was more effective than applied relaxation in the long term (Cuijpers et al., 2014).

Research has explored complementary and alternative medicines (CAM) for treatment of common mental health disorders (Helha & Wang, 2022). CAM refers to any practice that lies outside the domain of conventional treatments (World Health Organisation, 2012) and is influenced by mental, emotional, functional, spiritual, social, and community elements (Helha & Wang, 2022; World Health Organisation, 2012). The main modalities of CAM cover biology-based therapies (herbs and nutraceuticals), body therapies (acupuncture, aerobic exercises, massage, therapeutic touch, transcranial magnetic stimulation), mind-body therapies (yoga, tai chi, reiki, relaxation, and meditation), and alternative medical systems (ayurveda, homeopathy, herbal medicine), among others (Helha & Wang, 2022; National Center For Complementary And Integrative Health, NCCIH, 2021). A review of the efficacy of CAM in treating anxiety and depression concluded that the evidence base is poor, mainly due to the research methodology (use of small samples, short term trials and cross over trials), however the popularity of CAM interventions in the general population in Western countries remained strong (van der Watt et al., 2008).

Massage therapy is one of the most popular forms of CAM in the UK (Hunt & Ernst, 2010; Posadzki et al., 2012), US (American Massage Therapy Association: AMTA, 2004) and

is widely practiced in other areas in the world (Field et al., 2007). Massage consists of manipulation of soft tissue in varying areas of the whole body using pressure and traction (Edzard Ernst et al., 2008). Varying forms of massage have been used for thousands of years, across cultures around the world (Liu et al., 2015). Massage therapy involves techniques such as stroking, vibration, holding, and pressing. One common aspect of all techniques used in massage therapy is the concept of touch (Barnes et al., 2008; Moraska et al., 2010).

The positive effects of touch-based intervention and massage therapy are widely reported (Field, 2019; Moyer et al., 2004). Beneficial physical effects of massage have been found (Field, 2016). Examples include, but are not limited to, a reduction in pain (Crawford et al., 2016) and reduction in blood pressure (Chompoopan, 2016). Psychological beneficial effects have been reported, for example an increase in well-being (Sharpe et al., 2007), reduction in aggression (Diego et al., 2002), reduction in stress, panic, fear and anger (Weze et al., 2007) and an increase in coping and relaxation (Weze et al., 2007). Positive effects on relationships have also been found with massage enhancing closeness and connection and improving relationships (Collinge et al., 2012; Field et al., 2008; Naruse et al., 2018). The effectiveness of massage therapy may be due to the interpersonal nature of receiving touch from another person (Gentsch et al., 2015) or it may be due to the general induction of relaxation as a consequence of body stroking or muscle manipulation (Gasibat et al., 2017; Weerapong et al., 2005). Massage therapy has specifically been shown to decrease cortisol levels and increase levels of serotonin and dopamine (Field et al., 2005).

There is evidence that massage therapy is effective in reducing depressive symptoms (Okamoto, 2005) and symptoms of anxiety (Billhult & Määttä, 2009). This is unsurprising considering the effects of massage therapy lend themselves to addressing symptoms of anxiety, such as stress, panic and fear (Weze et al., 2007). If massage therapy can help reduce some of these symptoms, then it would be beneficial to consider massage therapy as part of a treatment plan. Müller-Oerlinghausen et al. (2021) proposed a new medical discipline named “touch medicine” as complementary therapeutic approach in the treatment of



depression following the anti-depressive, anxiolytic and analgesic effects of salutary touch found in research.

In 2004, Moyer et al. conducted a meta-analysis of massage therapy research. The review included 37 studies and concluded that single applications of massage therapy were effective in reducing anxiety but not depression, whereas multiple applications of massage therapy were effective in reducing trait anxiety and depression. This suggests that the number of massage therapy sessions received is an important factor to consider. Hou et al. (2010) conducted a meta-analysis into the effects of massage therapy in people with depression and concluded that the studies reviewed were of moderate quality and standardised protocols for massage therapy were needed. Standardisation of the application of massage therapy would mean measuring the efficacy of intervention in studies would be more feasible.

When Rapaport et al. (2018) reviewed research around massage therapy and psychiatric disorders, they concluded that massage may be beneficial for individuals with depression and for decreasing symptoms of anxiety. It was acknowledged that more rigorous studies are required to draw further conclusions. The field of somatic psychotherapy explored body-oriented psychotherapeutic intervention (Rothschild, 2000). Tarsha et al. (2020) reviewed literature exploring body-centred interventions for psychopathological conditions. The studies included interventions such as massage therapy, reflexology, acupuncture, functional relaxation, emotional freedom technique, Rolfing (bodywork that reorganizes connective tissues in the body), yoga, tai-chi, and dance/movement therapy. Overall, Tarsha et al. (2020) found that massage therapy, tai-chi, dance/movement therapy, functional relaxation, reflexology, acupuncture and emotional freedom technique seemed to alleviate stress, depression, anxiety, bipolar disorder and facilitate pain reduction. Massage therapy was seen to have the most robust evidence and Tarsha et al. (2020) concluded that massage therapy is an effective intervention for psychopathological conditions.

## **Rationale and Objectives for this Review**

There has been a wealth of research exploring the effects of touch-based interventions, in particular massage therapy, in psychiatric disorders. An updated review on the research is needed in order to provide a greater understanding of the efficacy of massage therapy and mental health difficulties. This review aimed to provide that update by synthesising the research into touch-based interventions. Considering the overlap of symptoms and comorbidity, this review specifically focussed on anxiety and depression and their clinical counterparts MDD and GAD.

## **Method**

This systematic review was undertaken and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Page et al., 2021).

### **Searches and Screening**

Comprehensive literature searches were conducted using online databases in April 2022. Databases ProQuest (PsycINFO and Medline), PubMed and Web of Science were searched using the relevant search terms, as listed in Appendix 1.1. The search terms included descriptors for touch-based interventions, anxiety and depression. The search terms were as follows: (touch\* OR massag\* OR hug OR hugging OR stroking OR “affective touch”) AND (therap\* OR treat\* OR counsel\* OR psychotherap\*) AND (“low mood” OR depress\* OR anxi\* OR anxiety). The search term ‘stroke’ was excluded due to this retrieving large numbers of irrelevant papers relating to the medical condition of a stroke. The search terms were cross checked by a Merseycare NHS Foundation Trust librarian.

Records were exported from these databases into Endnote X9 where they were checked for duplicates through Endnote X9, and manually. Records were first screened by their titles, and then abstracts and a final number of papers were selected for full text screening

for eligibility and inclusion. Hand-searches of the references lists from the included articles did not reveal any additional papers for inclusion.

## **Eligibility Criteria**

To be eligible for inclusion, studies were required to quantitatively evaluate the effects of a touch-based intervention. Selecting quantitative methods only, enabled more parallel comparisons of the studies that use qualitative measurements of anxiety and depression, therefore providing information about the linear relationship between touch intervention and anxiety and/or depression. Studies in which participants received touch administered by another adult unknown to the participant were selected for inclusion. This was chosen in order to see the specific impact of the intervention without any interpersonal influence from an existing relationship. Studies were required to use validated measures of anxiety or depression in adults aged over 18 years. Analogue samples of anxiety and depression or their clinical counterparts specifically GAD and Depression were included. Only articles published in English between 2004 and 2022 were considered for inclusion in the review, to capture studies conducted after the review of Moyer et al. (2004). Studies using touch-based interventions, where touch was applied to various areas of the body: face, arms, hands, legs, feet and torso, were included.

Reviews, conference abstracts, and non-peer reviewed empirical articles were excluded. Grey literature was not included as it does not always follow research protocol procedures, however, it is acknowledged that publication bias may have occurred meaning studies that demonstrate no significant impact of massage therapy may have been lost from the review. Studies exploring touch-based interventions administered by the self or administered to someone else were excluded. Studies including individuals experiencing mental health difficulties, other than anxiety and/or depression (for example bipolar, ADHD, eating disorder, dementia, personality disorder, autism) or including a physical health element (for example cancer, physical pain, pregnancy) were also excluded, because touch may be

experienced differently, for example as less pleasant in individuals with chronic pain (Case et al., 2016; Gossrau et al., 2021).

## **Data Extraction**

Study characteristics pertinent to this review were extracted, specifically author(s), year, country, study design, sample characteristics, intervention period, type of touch intervention, measures and outcomes. These are summarised in *Table 1*.

## **Quality Assessment**

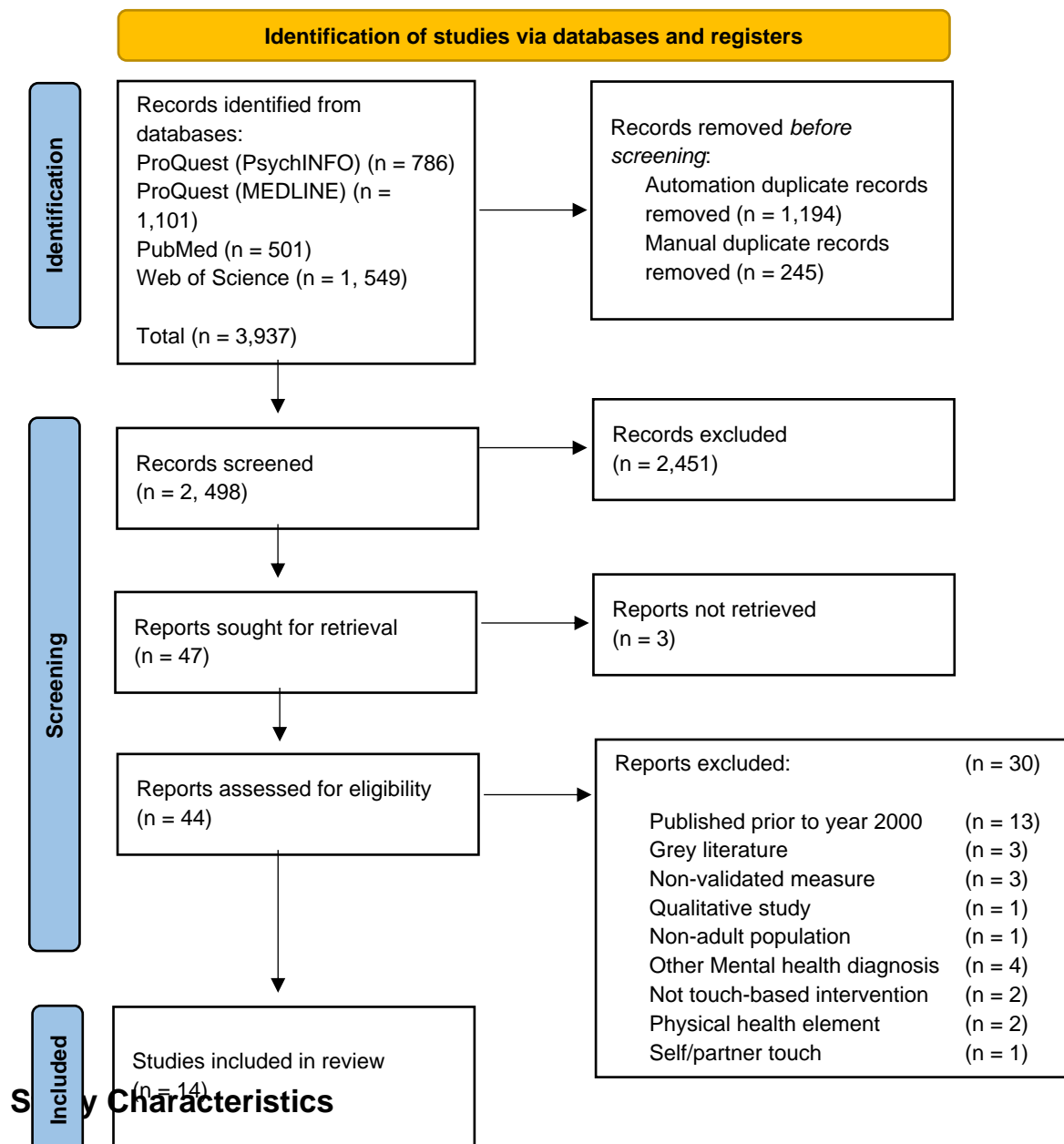
Each study was assessed using the “Quality Assessment Tool for Quantitative Studies” developed by the Effective Public Health Practice Project (EPHPP; Thomas et al., 2004; Appendix 1.2). The tool assessed the quality of six domains: selection bias, study design, confounders, blinding, data collection methods, and withdrawals and dropouts. Each domain was rated as ‘strong’, ‘medium’ or ‘weak’. These ratings were then used to produce an overall global rating of the study, indicating the quality of the study. Studies with no ‘weak’ ratings were given a ‘strong’ global rating, studies with one ‘weak’ rating were given a ‘moderate’ global rating and studies with two or more ‘weak’ ratings were given a ‘weak’ global rating. The studies were scored and rated by the author, and all were rated by another researcher and any discrepancies were discussed until a final decision was made.

## Results

The search strategy initially yielded 3,937 records, and 2,498 after duplicates were removed. After title and abstracts were screened, 47 studies were sought and 44 were retained. The full texts of these 44 studies were then screened for eligibility. Following this process, 14 studies met the inclusion criteria and were included for synthesis (see Figure 1).

**Figure 1**

*PRISMA Diagram*



## The effects of touch-based interventions on anxiety and depression: A Systematic Review

Table 1 reports study characteristics for the included studies. In the studies selected for the review, all touch-based interventions were massage interventions delivered by a trained massage therapist unknown to the participant. Massage interventions included Anma (Japanese massage), Swedish massage, Traditional Thai massage, aromatherapy massage, therapeutic body massage and Affect-regulating massage therapy (ARMT). A variety of measures were used in the studies, however, as the review was interested in the impact of touch-based therapy on anxiety, and/ or depression, only measures relating to these outcomes are reported in the table. The studies were grouped in terms of the outcome measured (depression, anxiety, anxiety and depression) and then within those groups, grouped again based on study design (cross-over, single group, or randomised control trial; RCT).

The included 14 studies were conducted between 2006 and 2021, and spanned across the world (Japan, Iran, Thailand, US, Australia, Brazil, Poland, Turkey, South Korea, Germany, Austria). The studies varied by sample size, ranging from 11 (Rapaport et al., 2021) to 101 participants (Kurebayashi et al., 2016). Six studies had mixed sex samples, five had all-female samples and three did not report the sex of the sample. Some studies included clinical samples (Arnold et al., 2020; Chompoopan et al., 2016; Rapaport et al., 2016, 2021; Sherman et al., 2010; Stötter et al., 2013), and some non-clinical samples (N = 8). The majority of studies utilised group comparisons (N = 9), three utilised a single group design (Chompoopan, 2016; Hatayama et al., 2008; Rapaport et al., 2021) and two studies employing cross-over designs (Donoyama et al., 2010; Gholami-Motlagh et al., 2016). Group comparisons included comparisons between massage intervention groups compared to control groups and massage intervention group compared to alternative interventions such as thermotherapy (Sherman et al., 2010) or therapeutic touch, an energy technique that does not involve physical touch (Yücel et al., 2020). The majority of the studies focused on anxiety as the primary outcome (N = 9), with two focussing on depression (Arnold et al., 2020; Stötter et al., 2013) and three focussing on both anxiety and depression (Rapaport et al., 2016; Sherman et al., 2010; Wu et al., 2014). To measure anxiety, studies used the State-Trait Anxiety

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

Inventory (STAI, STAI-X1, IDATE: Spielberger, 1983) and translated versions specific to the country the studies were conducted in, for example Japan, Korea and Thailand. The Hamilton Anxiety Rating Scale, reported as HARS or HAM-A (Hamilton, 1959) and Cattle Anxiety Scale (Alvandi, 1988) were also used. To capture depression, studies used the Hamilton Depression Rating Scale, reported as HDRS or HAM-D (Hamilton, 1960), Beck Depression Inventory (BDI: Beck, 1961) or Patient Health Questionnaire-8 (PHQ-8: Kroenke et al., 2001).

The effects of touch-based interventions on anxiety and depression: A Systematic Review

1

2 **Table 1** Study Characteristics

Outcome of interest	Design	Author (Year)	Country	Sample and intervention (N)	Sex F, M	Age (Mean)	Touch Type	Measures of interest
Depression	RCT	Arnold et al. (2020)	Germany	<b>Intervention (30)</b> Individuals with depression received ARMT for 60 minutes weekly over 4 weeks <b>Control (27)</b> Individuals with depression received Progressive Muscle Relation for 60 minutes weekly over 4 weeks	44, 13	Aged 19-64 Intervention (45.2) Control (44.9)	Affect-regulating massage therapy (ARMT; standardized massage technique, slow stroke)	Hamilton Depression Scale (HAM-D)
	RCT	Stötter et al. (2013)	Austria	<b>Intervention (14)</b> Individuals with moderate depression received 16 x 60-min sessions of mindfulness based-touch therapy over a period of 8 weeks. <b>Control (14)</b> Individuals with moderate depression received basic medicinal therapy	14, 14	Intervention (42.8) Control (41.4)	Gentle massage techniques and touch exercises	Hamilton Depression Rating Scale (HDRS)



The effects of touch-based interventions on anxiety and depression: A Systematic Review

				over a period of 8 weeks.				
<b>Anxiety</b>	<b>Cross-over design</b>	Donoyama et al. (2010)	Japan	<p><b>Group 1 (9)</b> Received 40-minute Anma massage on the first day, and a 40-minute rest intervention after a 3-day interval</p> <p><b>Group 2 (6)</b> Received a 40-minute rest intervention on the first day, and 40-minute Anma massage after a 3-day interval</p>	All F	(55.4)	Anma - Japanese massage	State Trait Anxiety Inventory Japanese version (STAI-JYZ)
	<b>Cross-over design</b>	Gholami-Motlagh et al. (2016)	Iran	<p><b>Group 1 (10)</b> 3 x 30-minute LAF massage therapy sessions per week for 4 weeks, a 6-week washout period then 3 x 30-minute BNC massage therapy sessions per week for 4 weeks</p> <p><b>Group 2 (10)</b> 3 x 30-minute BNC massage therapy sessions per week</p>	All F	Aged 20-51 LAF Group (39) BNC Group (37.1)	Leg, Arm, and Face (LAF) and Back, Neck, and Chest (BNC) massage using Swedish massage techniques	Cattle Anxiety Scale

The effects of touch-based interventions on anxiety and depression: A Systematic Review

				for 4 weeks, a 6-week washout period then 3 x 30-minute LAF massage therapy sessions per week for 4 weeks				
<b>Anxiety</b>	<b>Single group design</b>	Chompoopan et al. (2016)	Thailand	<b>Intervention (15)</b> Individuals diagnosed with depression received TTM for 1 x 90-minute session	Not reported	Aged 15-59 (48.6)	Traditional Thai massage	State Trait Anxiety Inventory (STAI; Thai version)
	<b>Single group design</b>	Hatayama et al. (2008)	Japan	<b>Intervention (32)</b> Individuals received a 45-minute facial	All F	Aged 20-40 (28.5)	Face massage	State Trait Anxiety Inventory Japanese version (STAI-JYZ)
	<b>Single group design</b>	Rapaport et al. (2021) (extension of Rapaport et al., 2016)	US	<b>Intervention (11)</b> Individuals with Generalised Anxiety Disorder received 45-minute Swedish massage therapy twice a week for six weeks.	Not reported	Not reported	Swedish massage	Hamilton Rating Scale for Anxiety (HAM-A)
<b>Anxiety</b>	<b>RCT</b>	Bost & Wallis (2006)	Australia	<b>Intervention (27)</b> Nurses who received a 15-minute back massage once a	Not reported	Not reported	Back massage	State-Trait Anxiety Inventory (STAI)

The effects of touch-based interventions on anxiety and depression: A Systematic Review

			week for 5 weeks <b>Control (21)</b> Nurses who completed measures only				
<b>RCT</b>	Kurebayashi et al. (2016)	Brazil	<b>Massage and Rest (30)</b> Intervention occurred two times per week for 4 weeks <b>Massage and reiki (38)</b> Intervention occurred two times per week for 4 weeks <b>Control group (33)</b> No intervention	67, 34	Massage and Rest (32.6) Massage and reiki (35.5) Control group (36.7)	Anma - Japanese massage	Trace State Anxiety Inventory (IDATE)
<b>RCT</b>	Wilczynska et al. (2019)	Poland	<b>Intervention (55)</b> Approximately 30 minutes of myofascial relaxation and post-isometric relaxation techniques, repeated 3-5 times <b>Control (35)</b> Approximately 30 minutes of Jacobson's progressive relaxation technique, repeated 3-5 times.	49, 41	Aged 20-25 Intervention (F = 22, M = 22) Control (F = 21, M = 22)	Soft tissue techniques and Swedish massage limited to the cervicothoracic complex	State-Trait Anxiety Inventory X1 (STAI-X1)

The effects of touch-based interventions on anxiety and depression: A Systematic Review

	RCT	Yucel et al. (2020)	Turkey	<p><b>Hand massage (10)</b> Individuals in a nursing home received a 10-minute hand massage every day for 3 days.</p> <p><b>Therapeutic touch (10)</b> Individuals in a nursing home received a 10-minute therapeutic touch intervention every day for 3 days.</p> <p><b>Control (10)</b> Individuals in a nursing home completed measures only</p>	15, 15	Aged 65-89	Hand massage or therapeutic touch	State Trait Anxiety Inventory (STAI)
Anxiety and Depression	RCT	Rapaport et al. (2016)	US	<p><b>Intervention (21)</b> Individuals with Generalised Anxiety Disorder (GAD) received 45-minute Swedish massage therapy twice a week for six weeks</p> <p><b>Control (19)</b> Individuals with GAD received 45-minute light touch twice a week for six weeks</p>	32, 8	Aged 20-68 Intervention (36.0) Control (37.4)	Swedish massage	Hamilton Anxiety Rating Scale (HARS) Hamilton Depression Rating Scale (HDRS) State Trait Anxiety Inventory (STAI)

<b>RCT</b>	Sherman et al. (2010)	US	<p><b>Intervention (23)</b> Individuals with GAD received 10 x 60-minute sessions of therapeutic massage over 12 weeks</p> <p><b>Thermotherapy (22)</b> Individuals with GAD received 10 x 60-minute sessions of temperature intervention over 12 weeks</p> <p><b>Relaxing room therapy (23)</b> Individuals with GAD were left to relax for 10 x 60-minute sessions over 12 weeks</p>	All F	<p>Aged 18-70</p> <p>Intervention (45.6)</p> <p>Thermotherapy (42.0)</p> <p>Relaxing room (41.3)</p>	Therapeutic massage	Hamilton Rating Scale for Anxiety (HAM-A) Patient Health Questionnaire (PHQ-8)
<b>RCT</b>	Wu et al. (2014)	South Korea	<p><b>Intervention (13)</b> Aromatherapy massage for 40 min twice per week for 4 weeks</p> <p><b>Control (12)</b> Completed measures only</p>	All F	Aged 34-48	Body aromatherapy massage	State Trait Anxiety Inventory Korean version (STAI)-KYZ Beck Depression Inventory (BDI)

## Quality Assessment

A summary of the individual components and overall global ratings for the quality assessment of the included papers is displayed in Table 2. Four studies received an overall quality rating of strong (Bost & Wallis, 2006; Kurebayashi et al., 2016; Rapaport et al., 2016; Sherman et al., 2010), three studies received an overall quality rating of moderate (Arnold et al., 2020; Gholami-Motlagh et al., 2016; Yücel et al., 2020) and seven studies received an overall quality rating of weak (Chompoopan, 2016; Donoyama et al., 2010; Hatayama et al., 2008; Rapaport et al., 2021; Stötter et al., 2013; Wilczyńska et al., 2019; Wu et al., 2014). Common areas for studies to receive a weak rating were in the selection bias, study design and confounders components of the quality rating tool.

Within the selection bias component, one study received a strong quality rating (Bost & Wallis, 2006) because the sample was very likely to be representative of the target sample and the demographics were clearly reported. Eight studies received moderate quality ratings and five received weak quality ratings. All of the studies reported the sample size, however some studies had particularly small sample sizes of fewer than 20 participants, therefore reducing the generalisability of the findings (Chompoopan, 2016; Donoyama et al., 2010; Gholami-Motlagh et al., 2016; Hatayama et al., 2008; Rapaport et al., 2021). A number of studies had a sample representative of the target population and had a high percentage of participants agree to take part, and these studies were within those that received a moderate quality rating (Arnold et al., 2020; Kurebayashi et al., 2016; Sherman et al., 2010; Stötter et al., 2013; Wu et al., 2014; Yücel et al., 2020).

With regards to study design, seven studies received a strong quality rating. This was because participants were randomly allocated, and the method of randomisation was clearly described. This included using random envelope and number systems, randomisation programmes, stratified randomization methods and external randomisers not involved in the study (Arnold et al., 2020; Bost & Wallis, 2006; Gholami-Motlagh et al., 2016; Kurebayashi et al., 2016; Rapaport et al., 2016; Sherman et al., 2010; Yücel et al., 2020). Two studies

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

received moderate quality ratings for study design because they employed a cohort study in which the same group were tested pre and post intervention (Chompoopan et al., 2016; Hatayama et al., 2008). Five studies received weak quality ratings, four because they identified as randomised, however no method was described (Donoyama et al., 2010; Stötter et al., 2013; Wilczyńska et al., 2019; Wu et al., 2014) and one because there was no comparison or control group to measure whether the intervention had been effective (Rapaport et al., 2021).

Confounders were particularly important in this review because there are a significant number of variables that could influence a participant's experience of a touch-based intervention and anxiety or depression scores. Ten of the 14 studies reported an exclusion criterion that addressed many variables that may impact experience of massage and anxiety and depression scores. Exclusion criteria included, but were not limited to, no symptoms of menopause, no strenuous exercise on intervention day, illicit drug use, pregnancy, no injured skin and no other mental health diagnosis such as schizophrenia. Eight studies were given a strong quality rating for the confounders component. This was because they had considered confounding variables during exclusion and they reported either no confounding demographic variables (Donoyama et al., 2010; Rapaport et al., 2016, 2021; Sherman et al., 2010; Wilczyńska et al., 2019) or they had controlled for confounding demographic variables (Bost & Wallis, 2006; Kurebayashi et al., 2016; Yücel et al., 2020). Six studies received quality ratings of weak, one because they considered confounding variables in their exclusion criteria and found confounding demographic variables that they didn't control for (Gholami-Motlagh et al., 2016), two because they considered confounding variables in their exclusion criteria but then did not report any group differences within the results (Arnold et al., 2020; Chompoopan et al., 2016) and three because no confounding variables were considered or reported at all (Hatayama et al., 2008; Stötter et al., 2013; Wu et al., 2014). Despite not reporting or controlling for confounding variables within their results section, Gholami-Motlagh et al.'s study (2016) identified in their conclusion that there were some cultural, social, and economical differences between the participants which might have affected the results.

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

The majority of studies (N = 11) received a moderate quality rating for the blinding component. Three studies received strong quality rating for this component (Arnold et al., 2020; Rapaport et al., 2016; Sherman et al., 2010). Arnold et al. (2020, p13) explains that blinding in massage studies is 'impossible' and one of the main methodological problems. As control groups are often lying quietly in a room or remaining on a waiting list, the participants are commonly not blind, as it is obvious whether they are in the massage intervention group or a control group. The participants were blinded in 6 of the studies, where there was a massage intervention group and a control group with an alternative intervention such as progressive muscle relaxation (Arnold et al., 2020; Kurebayashi et al., 2016; Rapaport et al., 2016; Sherman et al., 2010; Wilczyńska et al., 2019; Yücel et al., 2020). Another way to address blinding issues in massage studies, is to ensure the assessor is blinded by having a separate massage therapist and outcome assessor. This was specifically reported in three of the studies (Chompoopan, 2016; Gholami-Motlagh et al., 2016; Stötter et al., 2013). None of the studies received weak quality ratings, however it cannot be assumed that blinding occurred. The quality assessment tool instructs to give a moderate quality rating when blinding is not described.

It is worth noting that all studies received a strong quality rating for the data collection method component as all studies used valid and reliable measures to measure either anxiety or depression.

Reporting of withdrawals and dropouts was common across the studies, with eleven studies reporting both the number of withdrawals/dropouts and the reasons why. Nine studies received strong quality ratings for this component, two studies received a moderate quality rating for this component because withdrawal/dropout rates were reported, however the follow up rate was less than 80% (Rapaport et al., 2016, 2021) and three studies received weak quality ratings for this component because they did not report withdrawal/dropout rates (Hatayama et al., 2008; Wilczyńska et al., 2019; Yücel et al., 2020).

Finally, intervention integrity was considered within the quality assessment but did not contribute to the overall global rating. In all studies, the touch-based therapy or massage



The effects of touch-based interventions on anxiety and depression: A Systematic Review

interventions were delivered by trained massage therapists unknown to the participant. This ensured standardised interventions and increases the quality of the interventions.

The effects of touch-based interventions on anxiety and depression: A Systematic Review

1 **Table 2.** Quality Assessment

2

Study	Selection Bias	Study Design	Confounders	Blinding	Data Collection Method	Withdrawals/ Dropouts	Overall Rating
Arnold et al. (2020)	Moderate	Strong	Weak	Strong	Strong	Strong	Moderate
Stötter et al. (2013)	Moderate	Weak	Weak	Moderate	Strong	Strong	Weak
Donoyama et al. (2010)	Weak	Weak	Strong	Moderate	Strong	Strong	Weak
Gholami-Motlagh et al.	Moderate	Strong	Weak	Moderate	Strong	Strong	Moderate
Chompoopan et al. (2016)	Weak	Moderate	Weak	Moderate	Strong	Strong	Weak
Hatayama et al. (2008)	Weak	Moderate	Weak	Moderate	Strong	Weak	Weak
Rapaport et al. (2021)	Weak	Weak	Strong	Moderate	Strong	Moderate	Weak
Bost & Wallis (2006)	Strong	Strong	Strong	Moderate	Strong	Strong	Strong
Kurebayashi et al. (2016)	Moderate	Strong	Strong	Moderate	Strong	Strong	Strong
Wilczynska et al. 2019)	Weak	Weak	Strong	Moderate	Strong	Weak	Weak
Yucel et al. (2020)	Moderate	Strong	Strong	Moderate	Strong	Weak	Moderate
Rapaport et al. (2016)	Moderate	Strong	Strong	Strong	Strong	Moderate	Strong
Sherman et al. (2010)	Moderate	Strong	Strong	Strong	Strong	Strong	Strong
Wu et al. (2014)	Moderate	Weak	Weak	Moderate	Strong	Strong	Weak

3

## Study Findings

The study findings are outlined in Table 3. The included studies had a consistent pattern with regards to whether touch-based intervention, primarily massage, had a significant impact on anxiety and/or depression. Thirteen studies reported anxiety or depression to have reduced following the touch-based intervention. One study, exploring the impact of massage therapy on anxiety, showed no significant impact (Gholami-Motlagh et al., 2016). Initially, it would appear that touch-based interventions are successful in reducing anxiety and depression, however this was explored differently in the included studies and to a varying quality.

## Depression

Two studies explored the effects of massage on depression using randomised control trials (Arnold et al., 2020; Stötter et al., 2013). Both of these studies used a clinical population of individuals with depression diagnosis. Arnold et al. (2020), rated as moderate quality overall, used an ARMT intervention group and progressive muscle relaxation (PMR) group and hoped that by comparing a massage intervention to an alternative intervention, rather than 'no-treatment' control group, the conditions would be more equal. In both observer ratings and self-assessment, massage therapy was shown to reduce levels of depression. All participants were reported as having moderate depression. The milder the depression, the more likely massage therapy would be to have a reducing impact on symptoms. As the participants were all moderately depressed and depressive symptoms were reduced, the efficacy of massage therapy is demonstrated. Arnold et al. (2020) considered whether the reduction in depression was due to general relaxation or perhaps an increase in consciousness of body perception. Arnold et al. (2020) predicted that using a placebo, or no-treatment control group would produce greater effect sizes, compared to the effect sizes of massage versus alternative treatment. However, by using a massage intervention versus alternative treatment, this study provides rich data because the reduction in depression can

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

be attributed specifically to the massage intervention, rather than if it was compared with no treatment at all.

Stötter et al. (2013), rated as weak quality overall, used a mindfulness based-touch therapy group versus a medicinal therapy control group to explore the impact of touch therapy on depression. They found a significant reduction in depression and a significant difference between the two groups. They received a weak rating due to lack of reporting of randomisation method and lack of reporting of confounding variables and controlling for them. The touch therapy involved mindfulness techniques to increase bodily awareness. Stötter et al. (2013) considered the mindfulness aspect of the intervention to contribute to a change of perspective on an individual's identity and a change in sense of self. They argued that the combination of touch therapy and mindfulness techniques have the potential to address some of the difficulties individuals with depression experience, such as lack of body awareness (Segal et al., 2002), lack of confidence in their own body (Müller-Oerlinghausen et al., 2007) and muscle tension (Stötter et al., 2013).

Three studies explored the effects of massage on depression and anxiety (Rapaport et al., 2016; Sherman et al., 2010; Wu et al., 2014) using randomised control trials. The proceeding observations will focus on the impact of depression only. Rapaport et al. (2016) explored the effects of Swedish massage therapy on anxiety and depression in individuals with GAD and received a strong quality rating. At the end of six weeks, Swedish massage therapy was shown to cause significant improvement in symptoms of depression compared to light touch. The authors reported that these effects were evident after 3 weeks and continued to improve up to six weeks. Standardised Swedish massage techniques were used which Rapaport et al. (2016) argued would be beneficial as a treatment option as dissemination would be easier and intervention would not have to be personalised. Rapaport et al. (2016) argued that Swedish massage therapy yields effects on both psychological and physiological symptoms of depression, based on the results of the depression measure showing a reduction in anger, hostility and fatigue.

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

Sherman et al. (2010) explored the impact of therapeutic massage, thermotherapy and relaxation room on anxiety and depression in individuals with GAD and received a strong quality rating. They reported a significant reduction of depression, however no significant effect between the intervention and control group. They acknowledged that the study lacked a no-treatment control group which meant that they could not conclude that all treatments were equally effective or ineffective. As there were no significant differences between the groups, the effects could not be attributed to the massage intervention. However, as all groups showed a significant improvement in depression scores, Sherman et al. (2010) did draw the conclusion that elements common to all the treatment groups (offering a safe and attractive environment, the opportunity to take time out of life, relaxing music, and instruction and encouragement to practice deep breathing), were responsible for some of the observed therapeutic effects.

Wu et al. (2014) explored the effects of aromatherapy massage on depression, compared to a no-treatment control group. They received a weak quality rating due to lack of reporting of randomisation methods and controlling of confounding variables. They found a significant reduction in depression and a significant difference between the two groups. Wu et al. (2014) argued that aromatherapy massage has a beneficial impact on stress management and with results from physiological measures they took (electroencephalography (EEG), plasma and cortisol), they further suggested that aromatherapy massage could prevent stress related psychiatric problems via body—brain interaction.

With the data presented here, it is suggested that massage therapy may be beneficial in reducing depression, or depressive symptoms, in clinical (GAD, MDD) and non-clinical populations. It is suggested that the efficacy of massage therapy is increased when techniques to increase body awareness, such as mindfulness, are combined with a touch-based intervention.

## **Anxiety**

Two studies explored the effects of massage on anxiety using cross-over designs (Donoyama et al., 2010; Gholami-Motlagh et al., 2016). In both studies, there were two groups of intervention with all participants receiving massage therapy. In Donoyama et al. (2010), group 1 received 40-minute Anma massage on the first day, and a 40-minute rest intervention after a 3-day interval and group 2 received a 40-minute rest intervention on the first day, and 40-minute Anma massage after a 3-day interval. In Gholami-Motlagh et al. (2016), group 1 received three 30-minute LAF massage therapy sessions per week for 4 weeks, a 6-week washout period then three 30-minute BNC massage therapy sessions per week for 4 weeks and group 2 received 3 x 30-minute BNC massage therapy sessions per week for 4 weeks, a 6-week washout period then 3 x 30-minute LAF massage therapy sessions per week for 4 weeks. There were no significant differences between groups for either of the studies. Donoyama et al. (2010) found a significant reduction in anxiety, however, the study quality was rated as weak, due to limitations in selection bias and study design. Gholami-Motlagh et al. (2016) showed limitations in reporting any control for confounding variables, which presents a problem with drawing the conclusion that it was solely the massage intervention that had an impact on anxiety scores. Both studies took baseline measurements of anxiety, however, due to the nature of the design, there was no control group. Neither study showed overall strong quality ratings, suggesting cross-over design may not be a sufficient design to explore massage therapy and limiting the influence these studies can have on the evidence base for massage therapy.

Three studies explored the effects of massage on anxiety using a single group design and found significant reductions in anxiety following massage therapy (Chompoopan et al., 2016; Hatayama et al., 2008; Rapaport et al., 2021). All of the studies, however, received overall weak quality ratings and all received weak quality ratings in the selection bias components due to small sample sizes. Chompoopan et al. (2016) suggested a long-term treatment with a follow up could be explored in future research. As they focused on individuals

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

with depression, a long-term treatment of massage therapy may be more appropriate as there would be an opportunity to explore the influence of depression on the outcome of anxiety which could inform future treatment plans. They also measured heart rate and found a reduction in heart rate following massage, which they attributed to feelings of relaxation and comfort during the massage. Hatayama et al. (2006) studied physical as well as psychological effects of facial massage and considered whether increased sympathetic nervous activity may have been a positive stress reaction, therefore facial massage has a psychological relaxing and physically activating effect. Hatayama et al. (2006) considered whether the effect of facial massage had a refreshing, rather than relaxing effect, and the physically activating properties of facial massage could be the contributing factor to reduced tension and psychological distress. Rapaport et al. (2021) found a significant effect of massage on anxiety in individuals with GAD, however, this study was a follow up from Rapaport et al. (2016), meaning they did not have a control to compare any significant differences. To conclude, the main effect of massage intervention on anxiety appears to not be reliable when using a single group design in which the main outcome is measured immediately before and after a one-time intervention with no control group.

Four studies explored the effects of massage on anxiety using randomised control trials (Bost & Wallis, 2006; Kurebayashi et al., 2016; Wilczyńska et al., 2019; Yücel et al., 2020). These studies all showed significant effects of massage on anxiety and a significant difference between the massage intervention group and alternative intervention and/or control groups. Two were rated as strong in quality (Bost & Wallis, 2006; Kurebayashi et al., 2016), one as moderate quality (Yücel et al., 2020) and one as weak quality (Wilczyńska et al., 2019).

The studies that received ratings of strong quality ratings overall hold the most significance within this review. Bost and Wallis (2006) found a significant difference in anxiety scores for nurses who received a 15-minute back massage once a week for 5 weeks. They used the STAI to capture anxiety levels in terms of how participants generally feel (trait) or how they feel at a particular moment in time (state) in relation to anxiety. At baseline, the control group, consisting of nurses who completed measures only, was reported to have state

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

and trait STAI scores that were below the population norm while the massage intervention group had state and trait STAI scores approximately eight points above the norm. The different state and trait scores between the groups at baseline, however, was non-significant. Following the intervention, state and trait STAI scores decreased in the intervention group but actually increased in the control group. Bost and Wallis (2006) indicated that nurses often work in stressful environments and so this may explain the increase in STAI scores. They suggested that a larger sample size be used in future which may increase the chances of having a sample that reflects the population norm for STAI scores, in which the findings may be more generalisable. Bost and Wallis (2006) also measure blood pressure which was found to reduce following massage. They considered the decrease in anxiety to be due to increased relaxation and decreased blood pressure.

Kurebayashi et al. (2016) studied the effects of Anma (Japanese massage) on anxiety using three groups: massage and rest, massage and reiki, and a control group with no intervention. reiki consists of laying of hands over an individual's body in order to connect with the natural energy field within the body. Massage and massage combined with reiki was effective in reducing the levels of stress and anxiety with massage and reiki proving to be more effective than massage and rest in reducing physical and emotional aspects of stress and anxiety. Kurebayashi et al. (2016) found a reduction of nightmares and reduction of insomnia in the massage and reiki group, and they considered whether this contributed to the reduction in anxiety. This suggests that energy-based interventions should be considered in conjunction with massage when employing massage therapy for reduction of anxiety. With stress contributing towards anxiety, this study could provide further information about reduction and also prevention of anxiety.

Yücel et al. (2020) explored the impact of hand massage on anxiety levels of individuals in a nursing home. They included a therapeutic touch group, as well as massage intervention and control group. Therapeutic touch is an energy-based intervention in which the practitioner moves their hands over the patient without directly touching them in order to balance energy within the body. Although hand massage significantly reduced anxiety,



## The effects of touch-based interventions on anxiety and depression: A Systematic Review

therapeutic touch was shown to be more effective. An increase in comfort levels from the massage intervention was considered to be the reason for reduced anxiety. Yucel et al. (2020) argued that within a nursing home, the application of therapeutic touch or massage can easily be implemented into regular care of patients, however it was acknowledged that this study sample was from one nursing home and, therefore, the findings cannot be generalised to the wider population of older adults.

Wilczyńska et al. (2019) explored the impact of myofascial relaxation (massage technique and Swedish massage techniques) compared to Jacobson's progressive relaxation (tensing and relaxing muscles) on anxiety within a non-clinical sample. They found a significant reduction in anxiety and a significant difference between the impact of myofascial relaxation and Jacobson's progressive relaxation. They considered this impact to be attributed to a state of relaxation from the massage intervention. The study received a weak overall rating with weak ratings in three components of the quality assessment (selection bias, study design and withdrawal/dropouts). Wilczyńska et al. (2019) acknowledged that their sample was a group of students and, therefore, not generalisable to a wider population.

The three studies exploring the effects of massage on depression and anxiety (Rapaport et al., 2016; Sherman et al., 2010; Wu et al., 2014) will be considered, focussing on the outcome of anxiety only. As previously stated, Sherman et al. (2010) explored the impact of therapeutic massage, thermotherapy and relaxation room on anxiety and depression in individuals with GAD and received a strong quality rating. They reported no significant effect on anxiety between the intervention and control group, however, all groups showed a significant improvement in anxiety scores. It was considered whether elements common to all the treatment groups were responsible for some of the observed therapeutic effects. One of these elements included offering a safe environment which would be considerably impactful on anxiety symptoms such as fear and feeling on edge (APA, 2013).

Rapaport et al. (2016) explored the effects of Swedish massage therapy on anxiety and depression in individuals with GAD and received a strong quality rating. At the end of six weeks, Swedish massage therapy was shown to cause significant improvement in symptoms

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

of anxiety compared to light touch. The authors reported that these effects were evident after 3 weeks and continued to improve up to six weeks. Rapaport et al. (2016) argued that the reduction in anxiety was due to an impact on both the psychological and physical symptoms of anxiety as the measure of anxiety showed decrease in psychic and somatic subscales.

Wu et al. (2014) explored the effects of aromatherapy massage on depression, compared to a no-treatment control group and received a weak overall quality rating. They found a significant reduction in anxiety and a significant difference between the two groups. They suggested that aromatherapy massage could prevent stress related psychiatric problems via body—brain interaction, which may have contributed to the impact on anxiety.

With the data presented here, it is suggested that massage therapy may be beneficial in reducing anxiety, or symptoms of anxiety, in clinical (GAD, MDD) and non-clinical populations. It is clear that the most effective way of studying the effects of massage therapy is by randomised control methods in which there is a control group, touch-based intervention group (massage), and an alternative intervention group (thermotherapy, progressive muscle relaxation). It is also suggested that incorporating an energy-based intervention (reiki or therapeutic touch) to massage therapy would be more beneficial in reducing anxiety than massage alone.

1 **Table 3.** Study Findings

Study	Group (s)	Did touch-based intervention significantly effect anxiety and/or depression?	If significant, what was the direction of the change?	Were there significant group differences?
Arnold et al. (2020)	<p><b>Intervention (30)</b> Individuals with depression received ARMT for 60 minutes weekly over 4 weeks</p> <p><b>Control (27)</b> Individuals with depression received PMR for 60 minutes weekly over 4 weeks</p>	Yes	Depression reduction	Yes, difference between groups was $p < 0.05$
Stötter et al. (2013)	<p><b>Intervention (14)</b> Individuals with moderate depression received 16 x 60-min sessions of mindfulness based- touch therapy over a period of 8 weeks.</p> <p><b>Control (14)</b> Individuals with moderate depression received basic medicinal therapy over a period of 8 weeks.</p>	Yes	Depression reduction	Yes, difference between groups was $p < 0.001$
Donoyama et al. (2010)	<p><b>Group A (9)</b> Received 40-minute Anma massage on the first day, and a 40-minute rest intervention after a 3-day interval</p> <p><b>Group B (6)</b> Received a 40-minute rest intervention on the first day, and 40-minute Anma massage after a 3-day interval</p>	Yes	Anxiety reduction	No; difference between Anma and rest was $p = 0.053$

The effects of touch-based interventions on anxiety and depression: A Systematic Review

Gholami-Motlagh et al. (2016)	<p><b>Group 1 (10)</b> 3 x 30-minute LAF massage therapy sessions per week for 4 weeks, a 6-week washout period then 3 x 30 BNC massage therapy sessions per week for 4 weeks</p> <p><b>Group 2 (10)</b> 3 x 30-minute BNC massage therapy sessions per week for 4 weeks, a 6-week washout period then 3 x 30-minute LAF massage therapy sessions per week for 4 weeks</p>	No	N/A	N/A, both groups received massage intervention
Chompoopan et al. (2016)	<p><b>Intervention (15)</b> Individuals diagnosed with depression received TTM for 1 x 90-minute session</p>	Yes	Anxiety reduction	N/A, single group study
Hatayama et al. (2008)	<p><b>Intervention (32)</b> Individuals received a 45-minute facial</p>	Yes	Anxiety reduction	N/A, single group study
Rapaport et al. (2021) (extension of Rapaport et al., 2016)	<p><b>Intervention (11)</b> Individuals with Generalised Anxiety Disorder received 45-minute Swedish massage therapy twice a week for six weeks.</p>	Yes	Anxiety reduction	N/A, single group study
Bost & Wallis (2006)	<p><b>Intervention (27)</b> Nurses who received a 15-minute back massage once a week for 5 weeks</p> <p><b>Control (21)</b> Nurses who completed measures only</p>	Yes	Anxiety reduction	Yes: Difference between control and Anxiety state was $p = 0.006$ , difference between control and Anxiety trait was $p = 0.008$
Kurebayashi et al. (2016)	<p><b>Massage and Rest (30)</b> Intervention occurred two times per week for 4 weeks</p>	Yes	Anxiety reduction	Yes, difference between groups was $p < 0.01$

	<p><b>Massage and reiki (38)</b> Intervention occurred two times per week for 4 weeks</p> <p><b>Control group (33)</b> No intervention</p>			
Wilczynska et al. (2019)	<p><b>Intervention (55)</b> Approximately 30 minutes of myofascial relaxation and post-isometric relaxation techniques, repeated 3-5 times</p> <p><b>Control (35)</b> Approximately 30 minutes of Jacobson's progressive relaxation technique, repeated 3-5 times.</p>	Yes	Anxiety reduction	Yes, difference between groups was $p < 0.01$
Yucel et al. (2020)	<p><b>Hand massage (10)</b> Individuals in a nursing home received a 10-minute hand massage every day for 3 days.</p> <p><b>Therapeutic touch (10)</b> Individuals in a nursing home received a 10-minute therapeutic touch intervention every day for 3 days.</p> <p><b>Control (10)</b> Individuals in a nursing home completed measures only</p>	Yes	Anxiety reduction	Yes, difference between groups was $p < 0.05$
Rapaport et al. (2016)	<p><b>Intervention (21)</b> Individuals with Generalised Anxiety Disorder (GAD) received 45-minute Swedish massage therapy twice a week for six weeks</p> <p><b>Control (19)</b> Individuals with GAD received 45-minute light touch twice a week for six weeks</p>	Yes	Anxiety reduction Depression reduction	Yes, difference between groups for anxiety was $p < 0.05$ Yes, difference between groups for depression was $p < 0.05$

The effects of touch-based interventions on anxiety and depression: A Systematic Review

Sherman et al. (2010)	<p><b>Intervention (23)</b> Individuals with GAD received 10 x 60-minute sessions of therapeutic massage over 12 weeks</p> <p><b>Thermotherapy (22)</b> Individuals with GAD received 10 x 60-minute sessions of temperature intervention over 12 weeks</p> <p><b>Relaxing room therapy (23)</b> Individuals with GAD were left to relax for 10 x 60-minute sessions over 12 weeks</p>	Yes	Anxiety reduction Depression reduction	No, there was not significant difference between groups, $p = 0.39$
Wu et al. (2014)	<p><b>Intervention (13)</b> Aromatherapy massage for 40 min twice per week for 4 weeks</p> <p><b>Control (12)</b> Completed measures only</p>	Yes	Anxiety reduction Depression reduction	<p>Yes, difference between groups for anxiety was <math>p &lt; 0.05</math></p> <p>Yes, difference between groups for depression was <math>p &lt; 0.05</math></p>

## Discussion

Within the 14 studies selected for this review, 13 showed a significant effect of touch-based intervention on anxiety and/or depression within clinical (GAD and MDD) and non-clinical samples and one did not. This suggests that touch-based interventions, specifically massage therapy, are effective treatment options for anxiety or depression. The quality assessment indicated that not all the studies should hold the same weight when synthesising the results, however, the studies receiving moderate and strong quality ratings demonstrated significant effects of touch-based intervention in reducing anxiety and depression.

### Implications on Research and Practice

The efficacy of massage therapy for depression appears to be increased when techniques to increase body awareness, such as mindfulness, are combined with a touch-based intervention, and the efficacy of massage therapy for anxiety is increased when energy-based interventions (reiki or therapeutic touch) are combined with a touch-based intervention. Across both depression and anxiety, it was evident that studies are more effective at drawing conclusions about the impact of massage therapy when studied using randomised control methods, in which there is a control group, touch-based intervention group (massage), and an alternative intervention group (thermotherapy, progressive muscle relaxation). Using a touch-based intervention group, control group, and alternative intervention group provides stronger quality studies, which is unsurprising as they provide richer data in terms of specifying the findings to massage therapy, rather than other aspects such as a relaxing environment or positive therapeutic relationship. Exploring touch-based interventions using numerous sessions over a period of time, rather than a single session, is advised by Chompoopan (2016) and Moyer et al. (2004) would be most effective. Various reasons for this include being able to capture state anxiety (felt at the time) and trait anxiety (generally felt). It may also be beneficial to capture both psycho (for example aspects of mental health) and somatic symptoms (for example muscle tension or pain) when exploring the impact of touch-based

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

interventions on anxiety, as this can provide information on the mechanisms massage is impacting.

Previous research has provided insight into what enables massage therapy to be effective in reducing anxiety and depression. Ernst (2009) suggested massage therapy to have physical and psychological benefits due to the reduction in muscle tension, reduction of fatigue, increase in pain threshold, reduction in stress, reduction in anger and improvement in mood. Physiological effects of massage therapy was supported by Field et al. (2002,1998) demonstrating that massage therapy reduces muscle tension and facilitates oxygen and nutrients to reach the cells and tissues. Depression has been shown to relate to bad sleep, lack of body awareness, muscle tension, shallow breathing, a lack of energy and a loss of sensory awareness (Arnold et al., 2020; Stötter et al., 2013). The studies used in this review have hypothesised that massage therapy is effective in reducing anxiety and depression due to the effects of increased relaxation, reduced stress, reduction in nightmares, improved sleep (Bost & Wallis, 2006; Hatayama et al., 2008; Kurebayashi et al., 2016; Wilczyńska et al., 2019). Massage therapy may also be effective due to physiological effects such as an increase in oxytocin levels, reduction in cortisol and decrease in blood pressure. These effects are supported in other studies, for example showing the reduction in salivary cortisol following massage therapy (Field et al., 1997, 1998, 2008; Hart et al., 2001; Hernandez-Reif et al., 2000). The idea of using body-oriented intervention as a means of managing mental health is supported by somatic psychotherapy theory (Conger, 1994). Somatic psychotherapy refers to including psychotherapy including the body. The theory is based on the belief that thoughts, emotions and the body are linked, signifying that change can be brought about in one area (thoughts, emotions, body) by accessing another.

## Limitations and Direction for Future Research



## The effects of touch-based interventions on anxiety and depression: A Systematic Review

Previous reviews into the efficacy of touch-based interventions for mental health difficulties have also identified that massage therapy can reduce depression and anxiety (Rapaport et al., 2018; Tarsha et al., 2020). This review provided an update for this research and an indication as to how research in this field could be conducted more effectively.

The populations within the 14 studies used in this review, and the demographic data reported, were varied. There were numerous studies with an all-female sample and in those that had a mixed sample, the ratio of male to females were higher for the females. Ages of participants in the study samples also varied, however the majority of the samples fit into the 30-50 year old category. Based on sex and age, the findings could be generalisable to females between ages of 30-50 years old, however not generalisable to the general public. Populations included individuals with a depression diagnosis, individuals with an anxiety diagnosis and non-clinical samples including nurses, students and individuals residing in nursing homes. The context of touch is different amongst these groups, for example, individuals in a nursing home may not experience touch frequently and so a touch intervention may have more impact than with other populations who experience touch more frequently, for example a parent living with their children. This highlights heterogeneity, therefore limiting the generalisability of the findings.

The study designs within the review varied between randomised control trials, single-group designs, and cross-over designs. Each have their own limitation, such as the lack of control group in cross-over designs. Rapaport et al. (2016) highlighted the common limitation of massage therapy research being the inability to blind the participants to which group they have been randomised to. Some studies used massage intervention and alternative intervention groups in order to address this (Arnold et al., 2020), however, the lack of no-treatment control group makes it difficult to distinguish the impact of massage. Kurebayashi et al. (2016) used three groups, including massage and rest, massage and reiki, and a control group, which provided further information regarding the efficacy as massage and reiki was shown to be more effective in reducing anxiety than the massage and rest intervention.

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

Three out of the 14 studies included did not report withdrawal or dropout rates, however 11 of the studies had a 70% or higher participant retention rate. Studies with more than 15% dropout came from clinical populations of depression (Donoyama et al., 2010; Gholami-Motlagh et al., 2016) and anxiety (Rapaport et al., 2016, 2021). Research suggests that dropout within these populations, specifically for individual psychotherapy, is common (MDD, Cooper & Conklin, 2015; GAD, Gersh et al., 2017). Perhaps treatment options that require more proactive engagement, such as psychotherapy, would be difficult for someone with GAD or MDD to access and a less emotionally demanding intervention, such as massage therapy, may be a more psychologically accessible first line of treatment for individuals struggling with anxiety and depression. Higher symptom severity in anxiety and depression is associated with dropout (Lamers et al., 2012) and as massage therapy has been shown to reduce symptoms of depression and anxiety through the studies in this review, massage therapy could be accessed to reduce symptoms in order for individuals to then engage with psychotherapy. Rapaport et al. (2021) also demonstrates that massage therapy does not need to be an intensive intervention as six weeks massage therapy intervention was shown to be more effective than 12 weeks.

Within this review, half of the studies received an overall quality rating as weak. Common areas for studies to receive a weak rating were in the selection bias, study design and confounders components of the quality rating tool. Studies and reviews have highlighted difficulties, and therefore a need, in standardising massage therapy research so it was not surprising that weak ratings were common. The variety of countries in which the studies were conducted may also be a factor as it is suggested that research protocols may be different around the world, despite guidance provided by the World Health Organisation (WHO, 2004). Research methodology may be different around the world but more specific to this review, types of massage and touch norms may be different around the world. The studies selected for this review used varying types of massage, for example, Anma in Japan and Brazil (Donoyama et al., 2010; Kurebayashi et al., 2016), Swedish massage in the US, Poland and Iran (Gholami-Motlagh et al., 2016; Rapaport et al., 2016, 2021; Wilczyńska et al., 2019) and

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

Traditional Thai massage in Thailand (Chompoopan, 2016). In a survey of 14,478 participants spanning 45 countries, Sorokowska et al. (2021) examined cultural variation in affective touch; a slow, gentle, stroke-like touch linked to social bonding and connection (Löken et al., 2009; Morrison et al., 2010). They found differences in affective touch across cultures which were driven by individual (e.g., sex, age) and cultural factors (e.g., regional temperature, collectivism, and religiosity). Affective touch was found to be most prevalent in relationships with partners and children, and the prevalence of affective touch was higher in warmer, less conservative, and religious countries, and among younger, female, and liberal people. There were no UK based studies included in this review. This may be reflective of the touch norms within the UK, for example a reserved attitude to touch (Piper & Stronach, 2008) with a slight 'taboo' around the use of touch-based or complementary alternatives. There may also be a lack of UK based studies due to a lack of funding for evaluating use of body-oriented therapies. This may be because the NHS service is guided to offer psychological therapies such as CBT (NICE, 2009; 2011B) and so funding is provided for strengthening the evidence base of CBT. The types of massage and cultural differences demonstrated may imply that massage therapy would be offered and received differently depending on the cultural context and, therefore, this should be taken into consideration when exploring interpersonal touch-based interventions as part of treatment plans.

This review has provided an updated synthesis of research exploring the impact of touch-based interventions on anxiety and depression. Overall, massage therapy has been shown to reduce symptoms of anxiety and depression. These results indicate that massage therapy could be considered for symptom reduction and for the treatment of GAD and MDD. Posadzki and Parekh-Bhurke (2011) explored the incorporation of massage into psychotherapy and concluded that providing gentle touch or massage during a therapy session can improve outcome measures for management of depression by achieving mind-brain-body unity. Mind-brain-body-unity refers to the connection between mental and physical processes. Posadzki and Parekh-Bhurke (2011) explained that negative schemas (negative beliefs about ourselves based on past experiences) are common in depression and are

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

maintained by cognitive feedback through thoughts and sensory feedback through the body (Dunn et al., 2007). They suggested that skin receptors could be stimulated, through the use of massage, causing nerve impulses to the central nervous system, sending messages to the brain in order to increase bodily awareness, provide sensory feedback and alter negative thought patterns associated with depression (Holey & Cook, 2003). This could indicate future learning for trainee clinical psychologists to be understanding the benefits of touch or energy based interventions during training in order to use this learning in their role as clinical psychologists in educating staff and service users about the benefits of touch or energy-based interventions.

Lake and Turner (2017) recommend incorporating CAM using a collaborative model. This requires involving clients in the decision making for their treatment plan and as Lake and Turner (2017) highlight, CAM is used by individuals with severe mental health difficulties because they experience an improvement in their physical, emotional, cognitive, social, and spiritual functioning, a reduction in the severity of their symptoms and enhanced overall wellness (Sirois, 2008). Future studies require larger homogenous samples and the use of randomised methods in which there are numerous treatment groups to address limitations of blinding.

## **Conclusion**

This review of 14 studies suggests that massage therapy is effective in reducing symptoms of anxiety and/or depression, in clinical (GAD, MDD) and non-clinical populations. It is suggested that the efficacy of massage therapy is increased when techniques to increase body awareness, such as mindfulness, are combined with the touch-based intervention. Massage therapy is a difficult area to study due to lack of possibility for blinding or masking

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

participants. The most effective way to study the impact of massage therapy is to use a larger population sample and a randomised control trial in which there is a massage intervention group, alternative intervention group (such as thermotherapy or progressive muscle relaxation) and a no-treatment control group.

## Chapter I References

Alvandi, A. (1988). *Validity and reliability of Cattle inventory for Iranians*.

American Massage Therapy Association. Demand for massage therapy:

use and acceptance increasing. 2004. Available from: <http://www.amtamassage.org>

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). <https://doi.org/10.1176/appi.books.9780890425596>

Arnold, M. M., Müller-Oerlinghausen, B., Hemrich, N., & Bönsch, D. (2020). Effects of psychoactive massage in outpatients with depressive disorders: A randomized controlled mixed-methods study. *Brain Sciences*, *10*(10), 1–18.  
<https://doi.org/10.3390/brainsci10100676>

Barnes, P. M., Bloom, B., & Nahin, R. L. (2008). *Complementary and Alternative Medicine Use Among Adults and Children: United States, 2007*. American Psychological Association (APA). <https://doi.org/10.1037/e623942009-001>

Beck, A. T. (1961). An Inventory for Measuring Depression. *Archives of General Psychiatry*, *4*(6), 561. <https://doi.org/10.1001/archpsyc.1961.01710120031004>

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>

Borentain, S., Nash, A. I., Dayal, R., & DiBernardo, A. (2020). Patient-reported outcomes in major depressive disorder with suicidal ideation: a real-world data analysis using PatientsLikeMe platform. *BMC psychiatry*, *20*(1), 1-11.

Bost, N., & Wallis, M. (2006). The effectiveness of a 15 minute weekly massage in reducing physical and psychological stress in nurses. *Australian Journal of Advanced Nursing*, *23*(4).

Brown, T. A., Campbell, L. A., Lehman, C. L., Grisham, J. R., & Mancill, R. B. (2001). Current and lifetime comorbidity of the DSM-IV anxiety and mood disorders in a large clinical sample. *Journal of Abnormal Psychology*, *110*(4), 585–599.

The effects of touch-based interventions on anxiety and depression: A Systematic Review

<https://doi.org/10.1037/0021-843x.110.4.585>

Case, L. K., Čeko, M., Gracely, J. L., Richards, E. A., Olausson, H., & Bushnell, M. C.

(2016). Touch Perception Altered by Chronic Pain and by Opioid Blockade. *Eneuro*, 3(1), ENEURO.0138--15.2016. <https://doi.org/10.1523/eneuro.0138-15.2016>

Centre for Suicide Research. (2022). Clinical Guide: Assessment of suicide risk in people with depression. Department of Psychiatry, University of Oxford.

<https://www.dpt.nhs.uk/download/2hn1ZTaUXY>

Chompoopan, W. (2016). Effects Of Traditional Thai Massage On Heart Rate, Blood

Pressure, And Anxiety In Depression Patients: A Pilot Study. *International Journal of Geomate*. <https://doi.org/10.21660/2016.28.1360>

Chompoopan, W., Eungpinichpong, W., & Eungpinichpong, W. (2016). Effects of traditional thai massage on heart rate, blood pressure, and anxiety in depression patients: A pilot study. *International Journal of GEOMATE*, 11(6), 2892–2895.

<https://doi.org/10.21660/2016.28.1360>

Collinge, W., Kahn, J., Walton, T., Kozak, L., Bauer-Wu, S., Fletcher, K., Yarnold, P., &

Soltysik, R. (2012). Touch, Caring, and Cancer: randomized controlled trial of a multimedia caregiver education program. *Supportive Care in Cancer*, 21(5), 1405–1414. <https://doi.org/10.1007/s00520-012-1682-6>

Cooper, A. A., & Conklin, L. R. (2015). Dropout from individual psychotherapy for major depression: A meta-analysis of randomized clinical trials. *Clinical Psychology Review*, 40, 57–65. <https://doi.org/10.1016/j.cpr.2015.05.001>

Conger, J. P. (1994). *The body in recovery: Somatic psychotherapy and the self*. Frog Books.

Crawford, C., Boyd, C., Paat, C. F., Price, A., Xenakis, L., Yang, E., & Zhang, W. (2016).

The Impact of Massage Therapy on Function in Pain Populations - A Systematic Review and Meta-Analysis of Randomized Controlled Trials: Part I, Patients Experiencing Pain in the General Population. *Pain Medicine*, 17(7), 1353–1375.

<https://doi.org/10.1093/pm/pnw099>

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

Cuijpers, P., Sijbrandij, M., Koole, S., Huibers, M., Berking, M., & Andersson, G. (2014).

Psychological treatment of generalized anxiety disorder: A meta-analysis. *Clinical Psychology Review, 34*(2), 130–140.

<https://doi.org/https://doi.org/10.1016/j.cpr.2014.01.002>

de Mello, M. F., de Jesus Mari, J., Bacaltchuk, J., Verdelli, H., & Neugebauer, R. (2004). A

systematic review of research findings on the efficacy of interpersonal therapy for depressive disorders. *European Archives of Psychiatry and Clinical Neuroscience, 255*(2), 75–82. <https://doi.org/10.1007/s00406-004-0542-x>

Diego, M. A., Field, T., Hernandez-Reif, M., Shaw, J. A., Rothe, E. M., Castellanos, D., &

Mesner, L. (2002). Aggressive adolescents benefit from massage therapy.

*Adolescence, 37*, 597–607.

Donoyama, N., Munakata, T., & Shibasaki, M. (2010). Effects of Anma therapy (traditional

Japanese massage) on body and mind. *Journal of Bodywork and Movement Therapies, 14*(1), 55–64. <https://doi.org/10.1016/j.jbmt.2008.06.007>

Dunn, B. D., Dalglish, T., Ogilvie, A. D., & Lawrence, A. D. (2007). Heartbeat perception in

depression. *Behaviour Research and Therapy, 45*(8), 1921–1930.

<https://doi.org/10.1016/j.brat.2006.09.008>

Ernst, E. (2009). Massage therapy for cancer palliation and supportive care: a systematic

review of randomised clinical trials. *Supportive Care in Cancer, 17*(4), 333–337.

<https://doi.org/10.1007/s00520-008-0569-z>

Ernst, Edzard, Pittler, M. H., Wider, B., & Boddy, K. (2008). *Oxford Handbook of*

*Complementary Medicine*. Oxford University Press.

<https://doi.org/10.1093/med/9780199206773.001.0001>

Field, T. (2002). Massage therapy. *Medical Clinics of North America, 86*(1), 163–171.

[https://doi.org/10.1016/s0025-7125\(03\)00078-6](https://doi.org/10.1016/s0025-7125(03)00078-6)

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*(10), 1397-1413.



## The effects of touch-based interventions on anxiety and depression: A Systematic Review

Field, T. (2016). Massage therapy research review. *Complementary Therapies in Clinical Practice*, 24, 19–31. <https://doi.org/https://doi.org/10.1016/j.ctcp.2016.04.005>

Field, T. (2019). Social touch, CT touch and massage therapy: A narrative review. In *Developmental Review* (Vol. 51, pp. 123–145). Mosby Inc. <https://doi.org/10.1016/j.dr.2019.01.002>

Field, T., Diego, M., & Hernandez-Reif, M. (2007). Massage therapy research. *Developmental Review*, 27(1), 75–89. <https://doi.org/10.1016/j.dr.2005.12.002>

Field, T., Figueiredo, B., Hernandez-Reif, M., Diego, M., Deeds, O., & Ascencio, A. (2008). Massage therapy reduces pain in pregnant women, alleviates prenatal depression in both parents and improves their relationships. *Journal of Bodywork and Movement Therapies*, 12(2), 146–150. <https://doi.org/10.1016/j.jbmt.2007.06.003>

Field, T., Hernandez-Reif, M., Seligmen, S., Krasnegor, J., Sunshine, W., Rivas-Chacon, R., Schanberg, S., & Kuhn, C. (1997). 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., Peck, M., Krugman, S., Tuchel, T., Schanberg, S., Kuhn, C., & Burman, I. (1998). Burn Injuries Benefit from Massage Therapy. *Journal of Burn Care and Rehabilitation*, 19(3), 241–244. <https://doi.org/10.1097/00004630-199805000-00010>

Gasibat, Q., Suwehli, W., Bawa, A. R., Adham, N., turkawi, R. M. K. Al, & Baaoui, J. M. (2017). The Effect of an Enhanced Rehabilitation Exercise Treatment of Non-Specific Low Back Pain- A suggestion for Rehabilitation Specialists. *American Journal of Medicine Studies*, 5(1), 25–35. <https://doi.org/10.12691/ajms-5-1-3>

Gentsch, A., Panagiotopoulou, E., & Fotopoulou, A. (2015). Active Interpersonal Touch Gives Rise to the Social Softness Illusion. *Current Biology*, 25(18), 2392–2397. <https://doi.org/https://doi.org/10.1016/j.cub.2015.07.049>

Gersh, E., Hallford, D. J., Rice, S. M., Kazantzis, N., Gersh, H., Gersh, B., & McCarty, C. A. (2017). Systematic review and meta-analysis of dropout rates in individual psychotherapy for generalized anxiety disorder. *Journal of Anxiety Disorders*, 52, 25–

The effects of touch-based interventions on anxiety and depression: A Systematic Review

33. <https://doi.org/10.1016/j.janxdis.2017.10.001>

Gholami-Motlagh, F., Jouzi, M., & Soleymani, B. (2016). Comparing the effects of two Swedish massage techniques on the vital signs and anxiety of healthy women. *Iranian Journal of Nursing and Midwifery Research*, 21(4), 402–409.

<https://doi.org/10.4103/1735-9066.185584>

Goodwin, G. M. (2015). The overlap between anxiety, depression, and obsessive-compulsive disorder. *Dialogues in Clinical Neuroscience*, 17(3), 249–260.

<https://doi.org/10.31887/dcns.2015.17.3/ggoodwin>

Gossrau, G., Klimova, A., Lapp, H. S., Frost, M., Peschel, E., Weidner, K., Koch, T., Sabatowski, R., & Croy, I. (2021). C-tactile touch perception in patients with chronic pain disorders. *PAIN Reports*, 6(2), e941.

<https://doi.org/10.1097/pr9.0000000000000941>

Hamilton, M. (1959). The Assessment of Anxiety States By Rating. *British Journal of Medical Psychology*, 32(1), 50–55. <https://doi.org/10.1111/j.2044-8341.1959.tb00467.x>

Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery, and Psychiatry*, 23(1), 56–62. <https://doi.org/10.1136/jnnp.23.1.56>

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>

Hatayama, T., Kitamura, S., Tamura, C., Nagano, M., & Ohnuki, K. (2008). The facial massage reduced anxiety and negative mood status, and increased sympathetic nervous activity. *Biomedical Research*, 29(6), 317–320.

<https://doi.org/10.2220/biomedres.29.317>

Helha, Fernandes-Nascimento, M., & Wang, Y.-P. (2022). Trends in complementary and alternative medicine for the treatment of common mental disorders: A bibliometric analysis of two decades. *Complementary Therapies in Clinical Practice*, 46, 101531.

<https://doi.org/https://doi.org/10.1016/j.ctcp.2021.101531>

Hernandez-Reif, M., Field, T., Krasnegor, J., Hossain, Z., Theakston, H., & Burman, I.

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

- (2000). High blood pressure and associated symptoms were reduced by massage therapy. *Journal of Bodywork and Movement Therapies*, 4(1), 31–38.  
<https://doi.org/10.1054/jbmt.1999.0129>
- Holey, E. A., & Cook, E. M. (2003). Evidence-based therapeutic massage: a practical guide for therapists. *Elsevier Health Sciences*, 72.
- Hou, W.-H., Chiang, P.-T., Hsu, T.-Y., Chiu, S.-Y., & Yen, Y.-C. (2010). Treatment Effects of Massage Therapy in Depressed People. *The Journal of Clinical Psychiatry*, 71(07), 894–901. <https://doi.org/10.4088/jcp.09r05009blu>
- Hunt, K. J., & Ernst, E. (2010). Patients use of CAM: results from the Health Survey for England 2005. *Focus on Alternative and Complementary Therapies*, 15(2), 101–103.  
<https://doi.org/10.1211/fact.15.2.0005>
- Kessler, R. ~C., Gruber, M., Hettema, J. ~M., Hwang, I., Sampson, N., & Yonkers, K. ~A. (2007). Co-morbid major depression and generalized anxiety disorders in the National Comorbidity Survey follow-up. *Psychological Medicine*, 38(3), 365–374.  
<https://doi.org/10.1017/s0033291707002012>
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9. *Journal of General Internal Medicine*, 16(9), 606–613. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>
- Kurebayashi, L. F. S., Turrini, R. N. T., de Souza, T. P. B., Takiguchi, R. S., Kuba, G., & Nagumo, M. T. (2016). Massage and reiki used to reduce stress and anxiety: Randomized clinical trial. *Revista Latino-Americana de Enfermagem*, 24.  
<https://doi.org/10.1590/1518-8345.1614.2834>
- Lake J, T. M. (2017). Urgent Need for Improved Mental Health Care and a More Collaborative Model of Care. *The Permanente Journal*, 21., 17–024. doi: 10.7812/TPP/17-024.
- Lamers, F., Hoogendoorn, A. W., Smit, J. H., van Dyck, R., Zitman, F. G., Nolen, W. A., & Penninx, B. W. (2012). Sociodemographic and psychiatric determinants of attrition in the Netherlands Study of Depression and Anxiety (NESDA). *Comprehensive*

The effects of touch-based interventions on anxiety and depression: A Systematic Review

*Psychiatry*, 53(1), 63–70. <https://doi.org/10.1016/j.comppsy.2011.01.011>

Lepping, P., Whittington, R., Sambhi, R. S., Lane, S., Poole, R., Leucht, S., Cuijpers, P.,

McCabe, R., & Waheed, W. (2017). Clinical relevance of findings in trials of CBT for depression. *European Psychiatry*, 45, 207–211.

<https://doi.org/10.1016/j.eurpsy.2017.07.003>

Liu SL, Qi W, Li H, Wang YF, Yang XF, Li ZM, Lu Q, C. D. (2015). Recent advances in

massage therapy--a review. *European Review for Medical and Pharmacological Sciences*, 19(20).

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. <https://doi.org/10.1038/nn.2312>

López-López, J. A., Davies, S. R., Caldwell, D. M., Churchill, R., Peters, T. J., Tallon, D.,

Dawson, S., Wu, Q., Li, J., Taylor, A., Lewis, G., Kessler, D. S., Wiles, N., & Welton, N.

J. (2019). The process and delivery of CBT for depression in adults: a systematic review and network meta-analysis. *Psychological Medicine*, 49(12), 1937–1947.

<https://doi.org/10.1017/s003329171900120x>

McHugh, R. K., Whitton, S. W., Peckham, A. D., Welge, J. A., & Otto, M. W. (2013). Patient

Preference for Psychological vs Pharmacologic Treatment of Psychiatric Disorders. *The Journal of Clinical Psychiatry*, 74(06), 595–602. <https://doi.org/10.4088/jcp.12r07757>

Moraska, A., Pollini, R. A., Boulanger, K., Brooks, M. Z., & Teitlebaum, L. (2010).

Physiological Adjustments to Stress Measures Following Massage Therapy: A Review of the Literature. *Evidence-Based Complementary and Alternative Medicine*, 7(4), 409–418. <https://doi.org/10.1093/ecam/nen029>

Morrison, I., Löken, L. S., & Olausson, H. (2010). The skin as a social organ. *Experimental*

*Brain Research*, 204(3), 305–314. <https://doi.org/10.1007/s00221-009-2007-y>

Moyer, C. A., Rounds, J., & Hannum, J. W. (2004). A Meta-Analysis of Massage Therapy

Research. *Psychological Bulletin*, 130(1), 3–18. [https://doi.org/10.1037/0033-](https://doi.org/10.1037/0033-2909.130.1.3)

[2909.130.1.3](https://doi.org/10.1037/0033-2909.130.1.3)

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

- Müller-Oerlinghausen, B., Berg, C., & Droll, W. (2007). Die Slow Stroke® Massage als ein körpertherapeutischer Ansatz bei Depression. *Psychiatrische Praxis*, 34(S 3), 305–308. <https://doi.org/10.1055/s-2007-970988>
- Müller-Oerlinghausen, B., Eggart, M., Norholt, H., Gerlach, M., Kiebgis, G. M., Arnold, M. M., & Moberg, K. U. (2021). Berührungsmedizin ein komplementärer therapeutischer Ansatz unter besonderer Berücksichtigung der Depressionsbehandlung. *DMW - Deutsche Medizinische Wochenschrift*, 147(04), e32--e40. <https://doi.org/10.1055/a-1687-2445>
- Naruse, S. M., Cornelissen, P. L., & Moss, M. (2018). 'To give is better than to receive?' Couples massage significantly benefits both partners' wellbeing. *Journal of Health Psychology*, 25(10–11), 1576–1586. <https://doi.org/10.1177/1359105318763502>
- National Center For Complementary And Integrative Health (NCCIH), National Institutes of Health. Available on: Accessed, <https://nccih.nih.gov/>.
- National Institute for Health and Care Excellence. (2009). Depression in adults: Recognition and management. *National Institute for Health and Care Excellence Guidance*, 9(4). <https://doi.org/10.1211/CP.2017.20202439>
- National Institute for Health and Care Excellence. (2011a). Common mental health disorders Identification and pathways to care. *Health San Francisco*, 342(May), 1–57. [http://books.google.com/books?hl=en&lr=&id=\\_8h2mZD9w1IC&oi=fnd&pg=PA79&dq=Common+mental+health+disorders&ots=Sp4\\_V4D9iH&amp;sig=qQck0LdU26ypNwwC5XnHvmD2Qss](http://books.google.com/books?hl=en&lr=&id=_8h2mZD9w1IC&oi=fnd&pg=PA79&dq=Common+mental+health+disorders&ots=Sp4_V4D9iH&amp;sig=qQck0LdU26ypNwwC5XnHvmD2Qss)
- National Institute for Health and Care Excellence. (2011b). Treating generalised anxiety disorder and panic disorder in adults. *National Institute for Health and Care Excellence Guidance, January 2011*, 1–18.
- Okamoto. (2005). *Letter to the Editor The effect of aromatherapy massage on mild depression : November 2004*, 13162005.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D.,

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

- Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *International Journal of Surgery*, *88*, 105906. <https://doi.org/10.1016/j.ijsu.2021.105906>
- Piper, H., & Stronach, I. (2008). Don't touch. *The educational story of a panic*. New York.
- Posadzki, P., & Parekh-Bhurke, S. (2011). Incorporation of massage into psychotherapy: An integrative and conjoint approach. *Chinese Journal of Integrative Medicine*, *17*(2), 154–158. <https://doi.org/10.1007/s11655-011-0633-2>
- Posadzki, P., Watson, L. K., Alotaibi, A., & Ernst, E. (2012). Prevalence of complementary and alternative medicine (CAM) use by UK patients/consumers: A systematic review of surveys. *European Journal of Integrative Medicine*, *4*(3), e359. <https://doi.org/10.1016/j.eujim.2012.06.015>
- Rapaport, M. H., Schettler, P. J., Larson, E. R., Carroll, D., Sharenko, M., Nettles, J., & Kinkead, B. (2018). Massage Therapy for Psychiatric Disorders. *FOCUS*, *16*(1), 24–31. <https://doi.org/10.1176/appi.focus.20170043>
- Rapaport, M. H., Schettler, P. J., Larson, E. R., Dunlop, B. W., Rakofsky, J. J., & Kinkead, B. (2021). Six versus twelve weeks of Swedish massage therapy for generalized anxiety disorder: Preliminary findings. *Complementary Therapies in Medicine*, *56*, 102593. <https://doi.org/10.1016/j.ctim.2020.102593>
- Rapaport, M. H., Schettler, P., Larson, E. R., Edwards, S. A., Dunlop, B. W., Rakofsky, J. J., & Kinkead, B. (2016). Acute Swedish massage monotherapy successfully remediates symptoms of generalized anxiety disorder: A proof-of-concept, randomized controlled study. *Journal of Clinical Psychiatry*, *77*(7), e883–e891. <https://doi.org/10.4088/JCP.15m10151>
- Rothschild, B. (2000). *The body remembers: The psychophysiology of trauma and trauma treatment*. WW Norton & Company.

## The effects of touch-based interventions on anxiety and depression: A Systematic Review

Segal, Z. V., Teasdale, J. D., Williams, J. M., & Gemar, M. C. (2002). The mindfulness-based cognitive therapy adherence scale: inter-rater reliability, adherence to protocol and treatment distinctiveness. *Clinical Psychology & Psychotherapy*, 9(2), 131–138.

<https://doi.org/10.1002/cpp.320>

Sharpe, P. A., Williams, H. G., Granner, M. L., & Hussey, J. R. (2007). A randomised study of the effects of massage therapy compared to guided relaxation on well-being and stress perception among older adults. *Complementary Therapies in Medicine*, 15(3), 157–163. <https://doi.org/10.1016/j.ctim.2007.01.004>

Sherman, K. J., Ludman, E. J., Cook, A. J., Hawkes, R. J., Roy-Byrne, P. P., Bentley, S., Brooks, M. Z., & Cherkin, D. C. (2010). Effectiveness of therapeutic massage for generalized anxiety disorder: A randomized controlled trial. *Depression and Anxiety*, 27(5), 441–450. <https://doi.org/10.1002/da.20671>

Sirois, F. M. (2008). Motivations for consulting complementary and alternative medicine practitioners: A comparison of consumers from 1997-8 and 2005. *BMC Complementary and Alternative Medicine*, 8(1). <https://doi.org/10.1186/1472-6882-8-16>

Sorokowska, A., Saluja, S., Sorokowski, P., Frąckowiak, T., Karwowski, M., Aavik, T., Akello, G., Alm, C., Amjad, N., Anjum, A., Asao, K., Atama, C. S., Duyar, D. A., Ayebare, R., Batres, C., Bendixen, M., Bensafia, A., Bizumic, B., Boussena, M., ...

Croy, I. (2021). Affective Interpersonal Touch in Close Relationships: A Cross-Cultural Perspective. *Personality and Social Psychology Bulletin*, 47(12), 1705–1721.

<https://doi.org/10.1177/0146167220988373>

Spielberger, C. D. (1983). *State-Trait Anxiety Inventory for Adults*. American Psychological Association (APA). <https://doi.org/10.1037/t06496-000>

Stötter, A., Mitsche, M., Endler, P. C., Oleksy, P., Kamenschek, D., Mosgoeller, W., & Haring, C. (2013). Mindfulness-based touch therapy and mindfulness practice in persons with moderate depression. *Body, Movement and Dance in Psychotherapy*, 8(3), 183–198. <https://doi.org/10.1080/17432979.2013.803154>

Tarsha, M. S., Park, S., & Tortora, S. (2020). Body-Centered Interventions for

- The effects of touch-based interventions on anxiety and depression: A Systematic Review  
Psychopathological Conditions: A Review. *Frontiers in Psychology*, 10.  
<https://doi.org/10.3389/fpsyg.2019.02907>
- Thomas, B. H., Ciliska, D., Dobbins, M., & Micucci, S. (2004). A Process for Systematically  
Reviewing the Literature: Providing the Research Evidence for Public Health Nursing  
Interventions. *Worldviews on Evidence-Based Nursing*, 1(3), 176–184.  
<https://doi.org/10.1111/j.1524-475x.2004.04006.x>
- van der Watt, G., Laugharne, J., & Janca, A. (2008). Complementary and alternative  
medicine in the treatment of anxiety and depression. *Current Opinion in Psychiatry*,  
21(1), 37–42. <https://doi.org/10.1097/yco.0b013e3282f2d814>
- Weerapong, P., Hume, P. A., & Kolt, G. S. (2005). The Mechanisms of Massage and Effects  
on Performance, Muscle Recovery and Injury Prevention. *Sports Medicine*, 35(3), 235–  
256. <https://doi.org/10.2165/00007256-200535030-00004>
- Weze, C., Leathard, H. L., Grange, J., Tiplady, P., & Stevens, G. (2007). Healing by Gentle  
Touch Ameliorates Stress and Other Symptoms in People Suffering with Mental Health  
Disorders or Psychological Stress. *Evidence-Based Complementary and Alternative  
Medicine*, 4(1), 115–123. <https://doi.org/10.1093/ecam/nel052>
- Wilczyńska, D., Łysak-Radowska, A., Podczarska-Głowacka, M., Zajt, J., Dornowski, M., &  
Skonieczny, P. (2019). Evaluation of the effectiveness of relaxation in lowering the level  
of anxiety in young adults – A pilot study. *International Journal of Occupational  
Medicine and Environmental Health*, 32(6), 817–824.  
<https://doi.org/10.13075/ijomeh.1896.01457>
- World Health Organisation. (2004). A practical guide for health researchers. *Regional Office  
for the Eastern Mediterranean*.
- World Health Organisation. (2012). Traditional, complementary and integrative medicine. In  
*Traditional, Complementary and Integrative Medicine* (pp. 94–101).  
[https://doi.org/10.1007/978-1-137-26559-3\\_12](https://doi.org/10.1007/978-1-137-26559-3_12)
- World Health Organisation. (2016). *Investing in treatment for depression and anxiety leads  
to fourfold return*.



## The effects of touch-based interventions on anxiety and depression: A Systematic Review

Wu, J. J., Cui, Y., Yang, Y. S., Kang, M. S., Jung, S. C., Park, H. K., Yeun, H. Y., Jang, W.

J., Lee, S., Kwak, Y. S., & Eun, S. Y. (2014). Modulatory effects of aromatherapy massage intervention on electroencephalogram, psychological assessments, salivary cortisol and plasma brain-derived neurotrophic factor. *Complementary Therapies in Medicine*, 22(3), 456–462. <https://doi.org/10.1016/j.ctim.2014.04.001>

Yücel, Ş. Ç., Arslan, G. G., & Bağcı, H. (2020). Effects of Hand Massage and Therapeutic

Touch on Comfort and Anxiety Living in a Nursing Home in Turkey: A Randomized Controlled Trial. *Journal of Religion and Health*, 59(1), 351–364.

<https://doi.org/10.1007/s10943-019-00813-x>

Zbozinek, T. D., Rose, R. D., Wolitzky-Taylor, K. B., Sherbourne, C., Sullivan, G., Stein, M.

B., Roy-Byrne, P. P., & Craske, M. G. (2012). Diagnostic Overlap Of Generalized Anxiety Disorder And Major Depressive Disorder In A Primary Care Sample.

*Depression and Anxiety*, 29(12), 1065–1071. <https://doi.org/10.1002/da.22026>

1

## **Chapter II: Empirical**

2

3

### **The association between depressive symptoms and perceptions and attitudes to social touch**

4

## Abstract

### Background

Depression is associated with a loss of pleasure and social withdrawal. The absence of social interaction means that individuals experiencing depression may be missing out on key features of interpersonal relationships that encourage wellbeing, such as touch. Affective touch is a slow, gentle, stroke-like motion, that activates specific C-tactile (CT) afferents found in hairy skin. It is perceived as most pleasant at certain speeds (1-10cm/s) and locations of the body (hairy skin) and is linked to social bonding and connection. There are factors, such as attitudes and exposure to touch, that impact the perception of affective touch; however, no research has specifically examined whether depressive symptoms impact how pleasant affective touch is perceived. This study aimed to explore the association between depressive symptoms and the perception of affective touch. The more pleasant affective touch is perceived, the more an individual wants the touch, however, this has not been explored in the context of experiencing depressive symptoms, where general loss of pleasure is common. The perception of touch in this study was investigated using a vicarious touch paradigm. It was hypothesised that greater depressive symptoms would be associated with reduced pleasantness ratings, especially for stroking in the affective CT-optimal range (1-10cm/s) and CT-innervated location (forearm) (Hypothesis 1). It was hypothesised that greater depressive symptoms would be associated with a lower longing for touch (Hypothesis 2).

### Method

A within-subjects experimental design; online study with an adult sample (N = 226). The sample was predominantly female (79%), aged between 19-80 years old. Participants viewed 6 videos depicting social touch on 2 locations (the forearm and palm of the hand), each at 3 different velocities (one in the optimal affective touch range: 3cm/s and two in a comparison neutral range: 0.3 and 30 cm/s) then answered the question "How pleasant would it be to be touched like this?". They completed measures capturing depressive symptoms

The association between depressive symptoms and perceptions and attitudes to social touch

32 (BDI-II), general loss of pleasure (SHAPS), touch experiences and attitudes (TEAQ) and  
33 longing for touch (LITPQ).

## 34 **Results**

35 Linear mixed models showed a significant main effect of depressive symptoms on  
36 pleasantness ratings. The interaction between velocity and depressive symptoms was shown  
37 to be significant, however there was no significant effect of location and depressive symptoms.  
38 Hypothesis 1 was partially supported as greater depressive symptoms were associated with  
39 reduced pleasantness ratings but only in relation to velocity, not location. The higher the  
40 depression, the lower the perceived pleasantness across all the velocities, but especially for  
41 the fastest non-CT-optimal velocity. A regression analysis found an association between  
42 depression and touch longing, however when general loss of pleasure and touch experiences  
43 and attitudes were controlled for, this association was no longer significant, therefore  
44 disproving hypothesis 2.

## 45 **Conclusion**

46 Consistent with previous findings, the velocity of touch observed had a significant  
47 impact on how pleasant participants rated the touch, with touch in the CT-optimal range (0-10  
48 cm/s) being rated as more pleasant than non-CT-optimal touch. Location did not have a  
49 significant impact on the perceived pleasantness, however, unlike previous studies. The  
50 vicarious nature of the stimuli may be a contributing factor and so, it is suggested, that future  
51 studies consider direct touch as opposed to vicarious touch. A longing for touch is better  
52 explained by experiences or exposure to touch and also by a general loss of pleasure  
53 participants more than depressive symptoms. Further evidence is required to suggest whether  
54 touch would be an effective intervention for individuals with depression.

## Introduction

Depression is a mood disorder with key features being low mood and a general loss of interest and/or pleasure in the majority of daily activities (American Psychiatric Association; APA, 2013). The prevalence of depression in the UK is estimated to be 4.5% in adults (World Health Organisation: WHO, 2017) and is the leading cause of disability and premature death in people aged 18-44 years (National Institute for Health and Care Excellence: NICE., 2019), highlighting the importance of understanding experiences of depression to inform treatment approaches.

Although experiences of depression vary between individuals, the main symptoms that would lead to a diagnosis are a loss of interest in hobbies and activities that were previously pleasurable (APA, 2013). The word 'anhedonia' has also been used to describe these experiences (De-Fruyt et al., 2020). Experiencing loss of pleasure and interest, specifically a loss of interest in people, has shown to be significantly related to suicidal ideation (Yang et al., 2020), indicating a significant impact of these experiences. These characteristics of depression can also have a significant impact on others supporting someone with depression. In a study exploring this, family and caregivers of those with depression reported 'mourning a loss' of their loved one's personality and experiencing the closeness with their loved one as being most impacted (Muscroft & Bowl, 2000).

Social withdrawal and social isolation are also common characteristics of depression (APA, 2013). Kupferberg et al. (2016b) explored possible reasons for individuals with depression to experience social withdrawal and isolation and summarised the main factors to be: reduced desire to communicate (Atherton et al., 2015; Pelizza & Ferrari, 2009; Rey et al., 2009); increased sensitivity to peer rejection (Ehnvall et al., 2014; Slavich et al., 2010); diminished cooperativeness (Clark et al., 2013); competition avoidance (Kupferberg et al., 2016a); alterations in social decision-making (Radke et al., 2013) as well as problems in identifying emotions (Dalili et al., 2014) and in understanding how others think and feel (Bora & Berk, 2016; Donges et al., 2005).

The association between depressive symptoms and perceptions and attitudes to social touch

Social functioning is evidently impacted in depression; however, it is not clear whether individuals socially withdraw and isolate because they are already experiencing depression and do not find social interaction rewarding, or whether they socially withdraw and isolate and subsequently develop depression as a result of the lack of social interaction. Individuals with depression were found to not find social interaction as rewarding (Nezlek et al., 1994, 2000) and found to interpret social information in a negative way, leading to feeling rejected and avoiding social interaction (Tse & Bond, 2004). Social withdrawal is a strong predictor for the occurrence of depressive symptoms (Boivin et al., 1995), indicating that the lack of social interaction could contribute to depression. Porcelli et al. (2019), however, concluded that social withdrawal has been shown to persist after recovery from depression, suggesting that social withdrawal could be a consequence of depression. Whether social withdrawal and isolation are predictors or consequences of depression, the absence of social interaction means that individuals experiencing depression may be missing out on key features of interpersonal relationships that encourage wellbeing.

One such key feature is interpersonal touch (Gallace & Spence, 2010), which is evidenced to have many positive effects on humans (Barnett, 2005; Field, 2010). Touch plays an important role in development (Brauer et al., 2016; Hayes, 1998) communication (Hertenstein et al., 2006) and bonding (Suvilehto et al., 2015). Touch has been specifically associated with communicating sympathy and love (Hertenstein et al., 2006), reassurance and empathy (Golder, 1993), communicating relationship development (Morrison et al., 2010) and intimacy and support (Debrot et al., 2013). Touch can be thought of in terms of what it can signal, and the effect it can have on the receiver (Schirmer et al., 2022). Touch can signal proximity and safety (Eckstein et al., 2020) as well as a variety of emotions (Hertenstein et al., 2006; Kirsch et al., 2018). The receiver of touch may receive these signals accurately, for example, Hertenstein et al. (2006) found that when participants were instructed to express an emotion through touch, those receiving the touch were able to identify the emotions with accuracy of up to 83%. In terms of effects of touch, studies have found touch to be associated with a reduction in stress (Kurebayashi et al., 2016), a reduction in anxiety (Haynes et al.,

The association between depressive symptoms and perceptions and attitudes to social touch (2022), a reduction in fear (Coan et al., 2006) or a buffer to the pain of social exclusion (Von Mohr et al., 2017). The importance of touch facilitating social connection is emphasised in Salzman-Erikson and Eriksson's study (2005), with outpatient individuals, who had been treated for psychosis, describing a need for comfort, support and to feel connected through physical touch.

There are different types of touch, broadly described as discriminative touch and affective touch (McGlone et al., 2007). Discriminative touch is a general type of touch encoded by fast-conducting A $\beta$  nerve fibres and tells an individual about the physical properties of touch (McGlone et al., 2014). Affective touch is a more specific type of touch that has a social and emotional element as it is linked to social bonding and social connection (Morrison et al., 2010). It is characterised by a slow, gentle, stroke-like motion (Löken et al., 2009). Nordin (1990) discovered unmyelinated C-tactile (CT) afferents that respond to this light touch, and greater activation of these nerve fibres is associated with greater perceived pleasantness (Löken et al., 2009). CT afferents are not found in the non-hairy (glabrous) skin of the palms of the hands and soles of the feet (McGlone et al., 2007), but are found only in hairy skin, for example the forearm (McGlone et al., 2012; Trotter et al., 2016; Vallbo et al., 1993; Vallbo et al., 1999). Löken et al. (2009) found that CT afferents are sensitive to the speed of touch, being optimally activated by speeds of 1-10 cm/sec, which is also perceived as most pleasurable (Löken et al., 2009). The response of CT afferents has been shown to be reduced by rapid and very slow stroking and repeated stimulation (Löken et al., 2009); rapid stroking (> 10cm/s) is rated as more neutral. There is an inverted-U shaped relationship between touch pleasantness and stroking velocity (Löken et al., 2009), demonstrating that affective touch is especially pleasant at slow speeds, between 1-10cm/sec and not at speeds below 1cm/s or above 10cm/s. There is evidence that parents spontaneously stroke their infants at speeds consistent with CT-activation (Croy et al., 2016; Sehlstedt et al., 2016), suggesting an innate pleasantness and function of social bonding and connectedness.

Perceived pleasantness depends on individual differences and context. Attitudes towards touch (Sailer & Ackerley, 2019), touch exposure (Sailer & Ackerley, 2019),

The association between depressive symptoms and perceptions and attitudes to social touch perceptions of social support (Trotter et al., 2018) and attachment style (Krahé et al., 2018) have been shown to impact the perception of affective touch. Mental health difficulties are also shown to impact the perceived pleasantness of affective touch. Individuals with anorexia nervosa reported lower pleasantness ratings compared with individuals without anorexia nervosa and was considered to be attributed to a disordered CT-based affective touch system (Crucianelli et al., 2016). Autistic individuals have been shown to rate affective touch as less pleasant than individuals without autism (Croy et al., 2016) and individuals with post-traumatic stress disorder have been shown to rate affective touch as less pleasant than individuals without post-traumatic stress disorder (Strauss et al., 2019).

As evidenced, there are factors and mental health difficulties that impact the perception of affective touch. To date, no research has specifically examined whether depressive symptoms impact the perception of affective touch. This could be due to the lack of desire or motivation in individuals with depression to engage in research exploring interactions of a social nature such as touch, as they do not find social interaction pleasurable or perhaps the lack of funding in an area (touch) that is not thought of in the UK due to a reserved attitude and taboo around the use of touch-based treatments (Piper & Stronach, 2008). As part of the exploration into affective touch awareness in autistic individuals, Croy et al. (2016) measured depressive symptoms but found no effect of depression on affective touch awareness. Triscoli et al. (2019) identified that individuals scoring more highly on a depression measure showed a less positive attitude towards social touch, based on a social touch questionnaire. Touch exposure may impact on the perception of touch in individuals with depressive symptoms. Field (2002) found that individuals with greater intimacy with their parents had lower depression scores and individuals with less intimacy with their parents had higher depression scores. However, previous studies did not look at affective touch, which is the type of touch most linked to social bonding. This study explored whether there is an association between perceived pleasantness of affective touch and depressive symptoms.

Understanding the association between depressive symptoms and perceptions and attitudes towards affective touch could inform potential interventions. Interventions have



The association between depressive symptoms and perceptions and attitudes to social touch looked at social touch, though not always at CT-optimal velocities, and there is existing evidence to suggest that social touch can reduce depressive symptoms. Field et al. (1992) found that hospitalised individuals showed reduced depression levels following massage treatment. These findings were also demonstrated with depressed adolescent mothers who showed reduced depression and stress after massage therapy (Field et al., 1996). Hernandez-Reif et al. (1998) and Hernandez-Reif et al. (2001) demonstrated an increase in concentration of urinary 5-HIAA, (determining serotonin levels) following massage therapy. Both of these studies also showed patients to have reduced depression following massage but not control treatment. These results suggest that individuals with depressive symptoms could be encouraged to seek touch within a therapeutic setting in order to reduce their depressive symptoms. But, as previous research has shown, individuals with depression have a less positive attitude towards touch (Triscoli et al., 2019), so do individuals experiencing depressive symptoms desire touch? This is the second question that is addressed in this study.

Lack of intimacy, and lack of other forms of touch, may result in a longing for touch (Bessler et al., 2020). Bessler et al. (2020) studied “touch frequency” and “touch wish” with different forms of interaction (such as hug, stroke, handshake etc.) and different interaction partners. They found that for 72.7% of the 110 participants, their touch frequency was less than their touch wish. Bessler et al. (2020) explained that when an individual’s experience of “touch frequency” is lower than their “touch wish”, a longing for touch is identified. Bessler et al. (2020) focussed on touch in general, however, and when looking at affective touch, research suggests that the more pleasant affective touch is perceived, the more an individual wants the touch (Løseth et al., 2019; Perini et al., 2015) and individuals with less exposure to touch rate it as less pleasant, and therefore could be considered as less desired (Sailer & Ackerley, 2019). Thus, lower perceived pleasantness ratings may be linked to reduced longing for touch, but this has not yet been explored in the context of experiencing depressive symptoms.

Individuals may not have to directly receive touch to experience the beneficial effects previously identified, such as feelings of pleasantness (Löken et al., 2009). Morrison et al.

The association between depressive symptoms and perceptions and attitudes to social touch (2011) showed participants videos of affective touch on the forearm (3 cm/s skin stroking) and found a similar response in the posterior insula to experiencing touch first-hand, identifying that the brain is similarly activated by vicarious and felt touch. Furthermore, Walker et al. (2017) showed participants videos depicting social touch at CT-optimal and non-CT-optimal velocities and asked participants to rate the pleasantness. For this observed touch, the same pattern of pleasantness ratings were found (inverted U-shaped relationship with velocity) as previously seen with directly experienced touch (Löken et al., 2009). This research suggests that perception of touch can be explored with observed touch, not just direct touch.

The present study aimed to explore how people with depression perceive interpersonal touch, more specifically, the association between depressive symptoms and the perception of affective (vs. neutral) touch. Affective touch was shown at varying velocities and on the palm and forearm. Individual exposure to touch was captured due to the potential impact on perception of touch (Sailer & Ackerley, 2019). General loss of pleasure was measured to explore whether accounting for this factor, depression impacted how pleasant individuals perceived affective touch. To capture not only individuals' perception of whether affective touch is pleasant, but also their attitude to touch, touch longing was also explored, by measuring touch frequency and touch wish. The perception of touch in this study was investigated using a vicarious touch paradigm. Considering previous findings showing individuals with depression have experienced low touch exposure (Field, 2002) and individuals with low touch exposure rate it as less pleasant (Sailer & Ackerley, 2019), it was hypothesised that greater depressive symptoms would be associated with reduced pleasantness ratings, especially for stroking in the affective CT-optimal range (1-10cm/s) and CT-innervated location (forearm) (Hypothesis 1). As previous studies have demonstrated, the more pleasant affective touch is perceived, the more it is wanted (Løseth et al., 2019; Perini et al., 2015), it was hypothesised that greater depressive symptoms would be associated with a lower longing for touch (Hypothesis 2).

## Method

### Design

A within-subjects experimental design was used. Participants saw all conditions (6 videos of touch), but the order of velocities and locations were randomised across participants. Location had two levels: forearm (CT-innervated location) and palm of hand (non-CT innervated), and velocity had three levels: one CT optimal (3cm/s) and two CT-non optimal (0.5 cm/s and 30 cm/s), as in Walker et al. (2017). Depressive symptoms, measured by the BDI-II, were included in the model as a continuous variable. The dependent variable in this design was perceived pleasantness rating on a visual analogue scale. Longing for touch ratings, the other dependent variable, measured using a questionnaire (Longing for touch measure: Interpersonal Touch Picture Questionnaire; LITPQ; Bessler et al., 2020). Questionnaires also measured loss of general pleasure (Snaith–Hamilton Pleasure Scale; SHAPS; Snaith et al., 1995) and experiences and attitudes to touch (Touch Experiences and Attitudes Questionnaire; TEAQ; Trotter et al., 2018). These measures were included to control for any impact a general loss of pleasure and touch experiences and attitudes may have had on the perception of affective touch. The order of these measures were randomised across participants.

### Sample size and characteristics

The target sample size was  $N = 206$ , as the study was powered to test Hypothesis 1 (the more complex analysis). For an analysis with two fixed factors (touch location with two levels, and touch velocity with three levels), a covariate (depressive symptoms) and all interaction terms, and setting medium effect size of  $f = 0.25$ , alpha level = 0.05, and Power = 0.9, a minimum sample size of 206 was required.

This minimum sample size was exceeded: A total of 262 participants provided complete data and were included in the final sample. Participants were members of the general public, fluent in English, who did not experience allodynia, did not have visual

The association between depressive symptoms and perceptions and attitudes to social touch impairments and had access to the internet. The sample consisted of 54 males and 208 females, with an average age of 36 years old (SD = 10.7, range 19-80 years). The self-reported ethnic distribution was Caucasian (93%), African Caribbean (2%), Asian (4%) and Multi-ethnic (1%). N = 60 (23%) participants reported to have received a diagnosis of depression at some point in their lives and 18 (7%) reported to have received an additional and/or primary psychiatric diagnoses other than depression (including varying anxiety disorders, eating disorders, schizophrenia and personality disorder). N = 14 (5%) participants reported to have a disability and these included mood disorders such as bipolar, developmental disabilities such as autism and physical conditions such as hypothyroidism. Out of the 262 participants, 42 lived alone, 136 lived with one other person, 48 lived with two other people, 29 lived with three other people and seven lived with four other people.

## **Measures and Materials** **(Appendices 2.6- 2.10)**

### **Video Task (Walker et al., 2017).**

A total of 6 videos (as used in Walker et al., 2017) depicting social touch on 2 locations (the forearm and palm of the hand), each at 3 different velocities (0.5, 3 and 30cm/s). After each video, the question “How pleasant would it be to be touched like this?” with participants rating responses using a visual analogue scale from 0 = ‘not at all pleasant’ to 100 = ‘extremely pleasant’. Videos are available at:

<https://www.youtube.com/channel/UCgVzB3t6NCKwCFAX9Mr-Lg/videos> and stills of the videos are shown in Appendix 2.7.

### **Beck Depression Inventory (BDI-II; Beck et al., 1996).**

The BDI-II is a 21-item self-reporting questionnaire for evaluating the severity of depression in normal and psychiatric populations. Affective, cognitive, somatic and vegetative symptoms are covered on a 4-point scale from 0 (symptom absent) to 3 (severe symptoms).

The association between depressive symptoms and perceptions and attitudes to social touch  
Items are summed to produce a total score. Higher scores (0 – 63) denote greater depression severity. In the present study, the Cronbach's alpha value of the BDI-II was 0.955.

**Snaith–Hamilton Pleasure Scale (SHAPS; Snaith et al., 1995).**

A 14-item scale measuring anhedonia, the inability to experience pleasure. The questionnaire includes statements about general activities such as “I would enjoy my favourite television or radio programme”, requiring a selection of “strongly disagree”, “disagree”, “agree” or “strongly agree”. Either of the ‘disagree’ responses score 1 point and either of the ‘agree’ responses score 0 points. A score of 2 or less constitutes a “normal” score, while an “abnormal” score is defined as 3 or more. The SHAPS has adequate validity, satisfactory test-retest reliability (Franken et al., 2007), high internal consistency (Franken et al., 2007), and is a reliable, valid, and unidimensional instrument in adult outpatients with depression (Nakonezny et al., 2010). In the present study, the Cronbach's alpha value of the SHAPS was 0.812.

**Touch Experiences and Attitudes Questionnaire (TEAQ; Trotter et al., 2018).**

A 57-item self-report measure to determine attitudes toward and experiences of positive touch. The questionnaire consists of the following subscales: friends and family touch (FFT); current intimate touch (CIT); childhood touch (ChT); attitude to self-care (ASC); attitude to intimate touch (AIT); attitude to unfamiliar touch (AUT). Statements about touch experience or attitudes, such as “I usually hug my family and friends when I am saying goodbye” require responses ranging from “disagree strongly” to “agree strongly” which are scored between 1-5. Eight of 57 items were negatively worded, and reverse scored. Greater scores on the TEAQ denote more positive attitudes or more experience of touch. Trotter et al., (2018) demonstrated the TEAQ to have good face validity, internal consistency, construct validity in terms of discriminant validity, known-group validity and convergent validity, and criterion-related validity in terms of predictive validity and concurrent validity. In the present study, the Cronbach's alpha value of the TEAQ was 0.960.

**Longing for touch measure: Interpersonal Touch Picture Questionnaire (LITPQ; Bessler et al., 2020).**

The association between depressive symptoms and perceptions and attitudes to social touch

A measure of touch frequency and touch longing where six different types of touch are presented in relation to partners of different interactions, e.g., “to a romantic partner” or “to a male stranger”. Presented types of touch include hugging, stroking, kissing, holding, random touch and shaking hands. In relation to each picture and interaction partner, participants are asked “How often did you experience this type of touch in the last week?” and “How often would you have wanted to experience this type of touch in the last week?”. Participants are asked to choose a value between zero and infinite. A longing for touch score was calculated by dividing touch wish by touch frequency, the resulting outcome therefore reflects a ratio of the two subscales. Values higher than one (LITPQ score >1) are interpreted as longing for touch, because wanted amounts of touch were not met. Values lower than one (LITPQ scores <1) on the other hand are seen as touch satisfied. In the present study, the Cronbach’s alpha value of the LITPQ was 0.907.

## **Data analysis plan**

The plan of analysis is described in an Open Science Framework registration (registered July 2021; doi: [10.17605/OSF.IO/QTZ5R](https://doi.org/10.17605/OSF.IO/QTZ5R)). Descriptive analyses provided summary data for depressive symptoms, perceived pleasantness ratings and longing for touch ratings. Linear mixed models were used to examine the effect of touch velocity, touch location and depressive symptoms on perceived touch pleasantness. Pleasantness ratings for the different speeds and locations were nested within individuals (as a fully within-subjects design was employed). Predictors are speed (3 levels; CT-optimal vs. non-CT-optimal), location (2 levels; hand, arm) and depressive symptoms, as well as their interaction terms. General loss of pleasure and experiences and attitudes to touch were included as covariates. A regression analysis was used to explore the association between depressive symptoms and longing for touch. General loss of pleasure and experiences and attitudes to touch were controlled for in step 1 and longing for touch was added in step 2, with the outcome variable being depression scores.

The association between depressive symptoms and perceptions and attitudes to social touch

## **Procedure**

Ethical approval was gained from the University of Liverpool Research Review Committee (Appendix 2.1). The study was hosted on the online survey platform Qualtrics and was advertised via social media such as Facebook, Gumtree and online adverts through the University of Liverpool and Liverpool John Moores University. Participants accessed the study via a link from the online advert (Appendix 2.2). This could be accessed at any time by the participants. They were provided an information sheet (Appendix 2.3) and the opportunity to consent to taking part (Consent form: Appendix 2.4). Participation consisted of the completion of demographic questions (Appendix 2.5), followed by the Beck Depression Inventory-II (BDI-II; Beck et al., 1996, Appendix 2.6). Individuals then viewed 6 videos (as used in Walker et al., 2017, Appendix 2.7) depicting social touch on 2 locations (the forearm and palm of the hand), each at 3 different velocities (one in the optimal affective touch range: 3cm/s and two in a comparison neutral range: 0.3 and 30 cm/s). The order of velocities and locations were counterbalanced across participants. After each video, participants were then asked the question "How pleasant would it be to be touched like this?" Participants rated their response to this question using a visual analogue scale from very unpleasant (0) to very pleasant (100). Videos and following questions are shown in Appendix 2.7. Participants then completed the remaining measures which were randomised across participants: SHAPS (Snaith et al., 1995; Appendix 2.8), TEAQ (Trotter et al., 2018; Appendix 2.9) and LITPQ (Bessler et al., 2020; Appendix 2.10). Participants were given the opportunity to withdraw their data and provided a unique ID code which they were instructed to email the investigator in order to receive a £5 Love2Shop voucher. The full study questionnaire is presented in Appendix 2.12 and took participants approximately 20 minutes.

## **Results**

### **Data Analysis**

Data was collected between 10/09/2021 and 22/10/2021. All statistical analyses were conducted in IBM SPSS Statistics for Macintosh, Version 27.0. The planned analysis was followed.

### **Descriptive statistics**

The descriptive statistics for all variables are presented for the total sample in Table 1. Depressive symptoms ranged from 0-52 with mean depressive symptoms ( $M = 11.37$ ,  $S.D. = 11.28$ ) falling in the 'mild mood disturbance' range. In non-clinical populations, scores above 20 indicate depression, therefore, mean depressive scores fell below the clinical cut-off for depression as expected within a sample from the general public.



The association between depressive symptoms and perceptions and attitudes to social touch

Table 1 Descriptive statistics for all variables

	n = 262	Mean (SD)	Median	Minimum	Maximum
	Depressive symptoms (BDI-II)	11.4 (11.3)	8.0	0.0	52.0
	General loss of pleasure (SHAPS)	1.1 (2.0)	0.0	0.0	11.0
	Longing for touch (LITPQ)	0.4 (0.6)	0.3	0.0	8.1
	Friends and family touch (FFT)	3.7 (1.0)	3.9	1.0	5.0
	Current intimate touch (CIT)	3.4 (1.0)	3.6	1.0	5.0
Touch and experiences and attitudes Questionnaire (TEAQ) subscales	Childhood touch (ChT)	3.9 (0.9)	4.0	1.1	5.0
	Attitude to self-care (ASC)	3.8 (0.9)	4.0	1.0	5.0
	Attitude to intimate touch (AIT)	4.1 (0.8)	4.2	1.2	5.0
	Attitude to unfamiliar touch (AUT)	2.7 (0.9)	2.6	1.0	5.0
	Palm at 30cm/s	47.0 (30.7)	46.5	0.0	100.0
	Palm at 3cm/s	60.1 (27.8)	65.5	0.0	100.0
	Palm at 0.5cm/s	53.6 (30.3)	59.0	0.0	100.0
Touch Video pleasantness ratings	Forearm at 30cm/s	46.2 (29.2)	43.5	0.0	100.0
	Forearm at 3cm/s	63.0 (28.0)	70.0	0.0	100.0
	Forearm at 0.5cm/s	54.8 (39.8)	60.0	0.0	100.0

The association between depressive symptoms and perceptions and attitudes to social touch

## Correlations

To initially explore any association between the variables, correlations were conducted (Table 2). Non-parametric Spearman's Rho correlations were used as the scores for depressive symptoms, on the BDI-II, were not normally distributed.

Table 2. Spearman correlations between self-report measures

	BDI-II	SHAPS	TEAQ FFT	TEAQ CIT	TEAQ ChT	TEAQ ASC	TEAQ AIT	TEAQ AUT	TEAQ LITPQ
BDI-II	-								
SHAPS	.457**	-							
TEAQ FFT	-.354**	-.308**	-						
TEAQ CIT	-.418**	-.395**	.641**	-					
TEAQ ChT	-.331**	-.310**	.623**	.563**	-				
TEAQ ASC	-.202**	-.245**	.456**	.343**	.206**	-			
TEAQ AIT	-.244**	-.229**	.564**	.638**	.496**	.343**	-		
TEAQ AUT	-0.081	-0.043	.305**	.163**	.358**	-0.091	.302**	-	
LITPQ	-.124*	-0.013	.196**	.222**	.129*	0.106	.387**	.234**	-

Note. \*p<.05, \*\*p<.01

There was a moderate and positive significant correlation between BDI-II and SHAPS (see Table 2) implying that higher depressive symptoms were related to a greater general loss of pleasure.

There was a weak but significant correlation between BDI-II and LITPQ. The BDI-II was negatively correlated with the LITPQ, indicating that higher depressive symptoms were related to less longing for touch. This was explored further in the regression analysis.

The BDI-II and the majority of TEAQ subscales were significantly negatively correlated (see Table 2), with four subscales showing a very weak and negative correlation (FFT, ChT, ASC, AIT) and one showing weak and negative correlation (CIT). This indicates that greater depressive symptoms were related to less positive attitudes and/or experiences to friends and family touch, current intimate touch, childhood touch, attitude to self-care, attitudes to intimate

The association between depressive symptoms and perceptions and attitudes to social touch. The subscale capturing attitude to unfamiliar touch, however, was not significantly correlated to the BDI-II.

## **The influence of depressive symptoms on perception of affective touch**

A linear mixed model was conducted to examine the effect of touch velocity, touch location and depressive symptoms on perceived touch pleasantness.

There was a statistically significant main effect of depressive symptoms on pleasantness ratings,  $F(1, 1548) = 187.13, p < 0.001$ . The interaction between velocity and depressive symptoms was shown to be significant,  $F(2, 1050) = 3.63, p = 0.027$ , however there was no significant effect of location and depressive symptoms  $F(1, 1548) = 0.092, p = 0.761$ . Hypothesis 1 was partially supported as greater depressive symptoms were associated with reduced pleasantness ratings but only in relation to velocity, not location.

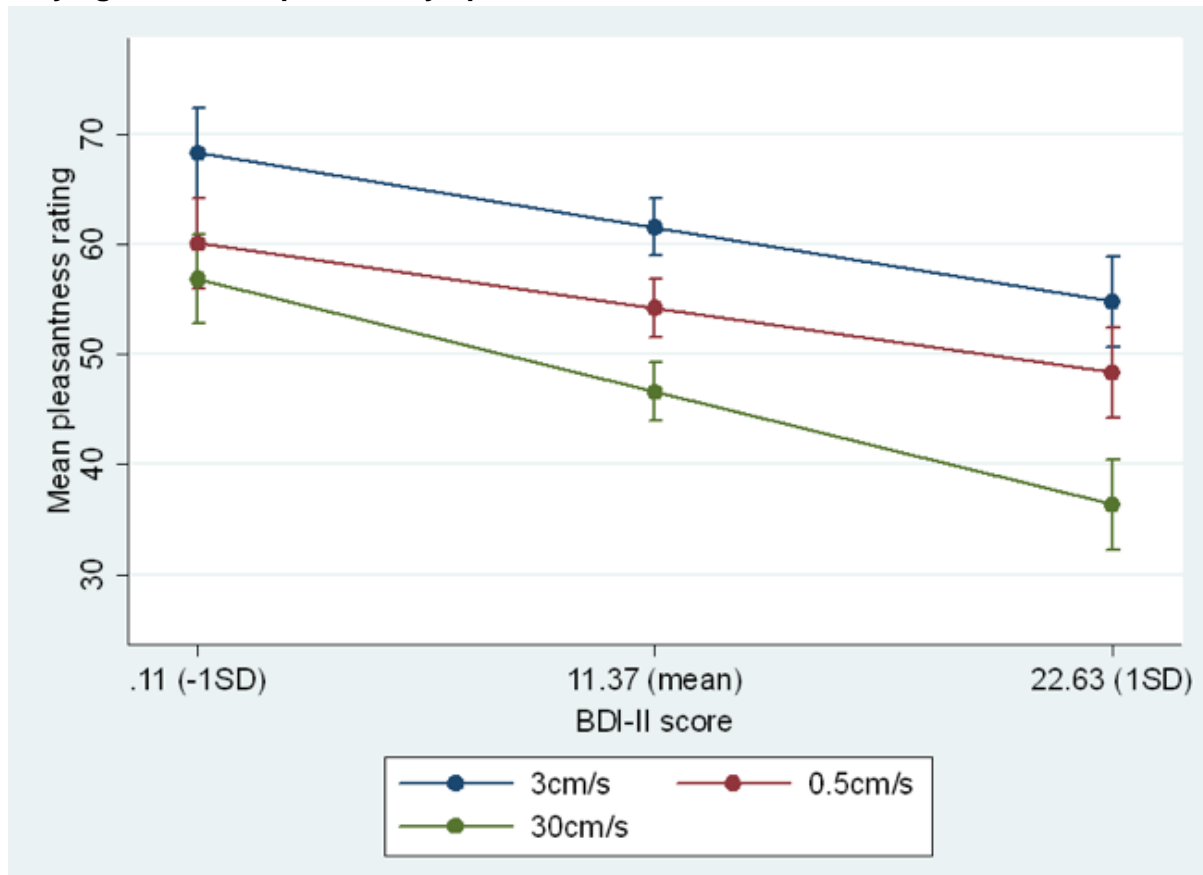
There was a significant effect of velocity on pleasantness ratings  $F(2, 1050) = 12.41, p < 0.001$ ). Consistent with previous findings (Löken et al., 2009), touch in the CT-optimal range (0-10 cm/s) was rated as more pleasant than non-CT-optimal touch.

The effect of location on pleasantness ratings was non-significant  $F(1, 1548) = 0.122, p = 0.727$ . Pleasantness was not influenced by whether the touch location was on CT-innervated or non-CT-innervated skin. The interaction between velocity and location,  $F(2, 1050) = 0.067, p = 0.935$ , was non-significant, as was the three-way interaction between velocity, location, and depressive symptoms,  $F(2, 1050) = 0.224, p = 0.799$ , therefore not supporting Hypothesis 1.

Figure 1 shows the interaction effect of velocity and BDI-II at -1S.D., the mean, and +1 SD of the sample. On the x-axis is the score on the BDI-II measuring depressive symptoms. As location was shown to have no significant effect or interaction effect, it was omitted from the graph. On the y-axis are the pleasantness ratings made by participants in response to the question "How pleasant would it be to be touched like this?". The velocities of social touch are plotted on the graph (0.5 cm/s, 3 cm/s and 30 cm/s). An alternative graph showing the same

The association between depressive symptoms and perceptions and attitudes to social touch interaction effect presented with an inverted U-shaped curve at each level of depression can be found in Appendix 2.11.

**Figure 1. Graph showing pleasantness ratings of affective touch at three velocities for varying levels of depressive symptoms.**



Bonferroni-corrected planned contrasts were carried out to examine the interaction in more detail. At moderate depressive symptoms (+1 S.D.), the fast velocity 30cm/s was rated as significantly less pleasant than the slowest velocity 0.5 cm/s ( $M = 22.63$ ;  $SE = 1.55$ ,  $Z = 7.74$ ;  $p < 0.00$ ). The CT-optimal velocity 3 cm/s was rated as significantly more pleasant than the non-CT optimal velocity 0.5cm/s ( $M = 22.63$ ;  $SE = 1.55$ ,  $Z = 4.15$ ;  $p < 0.00$ ).

At mild depressive symptoms, the same pattern was found, with participants rating the faster velocity 30cm/s as significantly less pleasant than the slower velocity 0.5cm/s ( $M = 11.37$ ;  $SE = 1.09$ ,  $Z = 6.95$ ;  $p < 0.00$ ) and the CT-optimal velocity 3 cm/s as significantly more pleasant than the non-CT optimal velocity 0.5cm/s ( $M = 11.37$ ;  $SE = 1.96$ ,  $Z = 6.68$ ;  $p < 0.00$ ).

The association between depressive symptoms and perceptions and attitudes to social touch

At low depressive symptoms, the CT-optimal velocity was significantly more pleasant than the slower velocity 0.5 cm/s ( $M = 0.11$ ;  $SE = 1.55$ ,  $Z = 5.30$ ;  $p < 0.00$ ), however, there was no significant difference between the two non-CT-optimal velocities, 0.5cm/s and 30cm/s ( $M = 0.11$ ;  $SE = 1.55$ ,  $Z = 2.09$ ;  $p = 0.22$ ). As the lower depression levels are more indicative of the general public, this preference for CT-optimal velocity of touch over non-CT-optimal velocities is expected (Löken et al., 2009; Nordin, 1990).

The higher the depression, the lower the perceived pleasantness across all the velocities, but especially for the fastest non-CT-optimal velocity; thus, the interaction was driven by the difference between the two non-CT optimal velocities.

## **Examining the association between touch longing and depressive symptoms**

A regression analysis based on 1000 bootstrap samples was carried out to explore the association between depressive symptoms and longing for touch. Bootstrapping was used as depressive symptoms were not normally distributed, as expected for a general population sample. There were no demographic variables to control for in the regression analysis because there was no significant relationship between BDI-II scores and age identified in Spearman's Rho correlations ( $r_s = 0.054$ ,  $p = 0.386$ ) and mean score comparisons on the BDI-II between gender indicates there was no difference in depressive symptoms between genders (Male:  $M = 9.76$ ,  $S.D. = 11.00$ ; Female:  $M = 11.79$ ,  $S.D. = 11.34$ ).

Initially, Spearman's Rho correlations (Table 2) indicated a relationship between depressive symptoms and longing for touch ( $r_s = -0.124$ ,  $p = 0.045$ ). When controlling for general loss of pleasure (SHAPS) and touch attitudes and experiences (TEAQ) in the regression analysis, however, the association became non-significant ( $b = 0.078$ ,  $S.E. = 0.097$ ,  $p = 0.08$ ). In step 1 of the regression analysis, 35% of the variance in depressive symptoms can be predicted by general loss of pleasure and touch experiences and attitudes ( $R^2 = .35$ ,  $F_{7, 254} = 0.08$ ,  $p = <0.001$ ). When longing for touch was added, in step 2, ( $R^2 =$

The association between depressive symptoms and perceptions and attitudes to social touch (.36,  $F_{1, 253} = 0.08$ ,  $p = .164$ ), 36% of the variance could be predicted by the variables. It is concluded that greater depressive symptoms are not associated with a lower longing for touch, therefore disproving Hypothesis 2.

## Discussion

In this study, the association between depressive symptoms and perception of affective touch was explored. It was predicted that greater depressive symptoms would be associated with reduced pleasantness ratings of touch, especially for stroking in the affective CT-optimal range (1-10cm/s) and CT-innervated location (forearm). Results showed that higher depressive symptoms were significantly related to lower perceived pleasantness. The velocity of touch observed had a significant impact on how pleasant participants rated the touch, with touch in the CT-optimal range (0-10 cm/s) being rated as more pleasant than non-CT-optimal touch. This is consistent with previous findings (Löken et al., 2009).

Previously, the location of affective touch has been shown to have a significant impact on the pleasantness perceived as there is a difference in CT-activation (McGlone et al., 2012; Trotter et al., 2016; Vallbo et al., 1993; Vallbo et al., 1999; Walker et al., 2017), The difference in ratings between glabrous and hairy skin is not a consistent finding, however (Pawling et al., 2017). In this study, no significant effect of location was found. This may be due to the vicarious nature of the stimuli, as participants were watching the affective touch, rather than experiencing tactile input. Walker et al. (2017), however, also explored vicarious social touch and reported pleasantness. They found a significant main effect of location, with touch on the back being rated significantly more pleasant than any other location (upper arm, ventral forearm, dorsal fore- arm and palm). The difference in the findings of this study and Walker et al. (2017) could indicate further exploration of the perceived pleasantness of vicarious touch would be beneficial.

There was no three-way interaction between location, velocity and depressive symptoms which, again, makes sense due to the absence of tactile input. Do we have a learnt response to gentle touch perhaps? As suggested by Pawling et al. (2017), could we have

The association between depressive symptoms and perceptions and attitudes to social touch learnt that a medium stroking velocity touch is pleasant so even when it is applied to the palm (an area with no CT-afferents), we still perceive it and rate it a pleasant? Perhaps the afferent input is in fact different for the palm and there are other afferents innervating the skin which could be responsible for that response. McGlone et al. (2012; 2014) hypothesised the perceived pleasantness on glabrous skin to be due to a learned or secondary reinforcement mechanism underpinned by low-threshold mechanoreceptors signalling in a pattern type of processing. Further research could explore the difference between hairy and glabrous skin afferents in order identify if there are other afferents responsible for perceived pleasantness in glabrous (non-CT-optimal) areas such as the palm. Location is important in activating CT-afferents because they are only found in hairy skin areas (McGlone et al., 2012; Trotter et al., 2016; Vallbo et al., 1993; Vallbo et al., 1999), however without directly experiencing the touch, CT-activation is not occurring. The factor of location may have a more impactful role if CT-innervation occurs.

The association between depressive symptoms and touch longing was also explored. An association between depression and touch longing was found, however when general loss of pleasure and touch experiences and attitudes were controlled for, this association was no longer significant. This suggests that longing for touch is better explained by experiences or exposure to touch and also by a general loss of pleasure participants may have been experiencing. The context in which the study took place is of interest here. It was conducted during the coronavirus pandemic when restrictions were placed on physical contact with other people in order to reduce the spread of the virus. Essentially, physical contact was limited to those you live with. In this sample, the majority of participants lived with one other person (N = 136) indicating very limited contact with others. Field et al. (2020) conducted a survey exploring touch deprivation during the COVID-19 pandemic. They found that 60% of 260 participants reported experiencing low to high levels of touch deprivation during the pandemic. Twenty-three reported to live alone, indicating that people who lived with others still experienced touch-deprivation. During the time of the pandemic, the nation was also receiving messages about the negative effects of physical contact. A reduced exposure to touch

The association between depressive symptoms and perceptions and attitudes to social touch combined with the messages being received, may have resulted in an aversion to touch and, therefore, an overall reduced desire for touch.

A cognitive consideration would also be fascinating to explore. For example, if individuals experience differences in their ability to imagine things or take perspective. If individuals receiving the touch in the videos aren't of the same gender, or ethnicity, judging how pleasant they may be experiencing the touch in order to consider how pleasant the participant may find it may be more difficult. As previously highlighted, this may impact the pleasantness ratings. This is also something to be aware of for individuals experiencing greater depressive symptoms. Cognitive processes have been shown to be limited when depressive symptoms are present (Jaeger et al., 2006; McCall & Dunn, 2003). This is particularly evident for processes such as perspective taking and empathy as there is a negative impact of depression on theory of mind ability (Ferguson & Cane, 2017; Fischer-Kern et al., 2013; Wolkenstein et al., 2011). This suggests that individuals may be unable to mentalise when observing the touch and may struggle to consider what that person receiving touch might be feeling in order to consider how they might feel.

This study found that individuals experiencing greater depressive symptoms perceive affective touch as less pleasant, which does not indicate that affective touch would be an effective intervention for individuals with depression. Touch has been shown to be effective in reducing depressive symptoms, for example in the form of aromatherapy massage (Okamoto, 2005) or Swedish massage (Rapaport et al., 2016) and with children and adults (Field, 2016; Field et al., 2007). The efficacy of touch in reducing depression in previous studies may be due to general touch, rather than affective touch. It may be the case that individuals experiencing greater depressive symptoms have a reduced desire to communicate (Atherton et al., 2015; Pelizza & Ferrari, 2009; Rey et al., 2009) and therefore touch that is social in nature (affective touch, Morrison et al., 2010) is not rewarding or appealing (Nezlek et al., 1994, 2000). There are other ways of activating CT-afferents, for example self-touch, or 'grooming behaviour' (McGlone et al., 2016). If individuals experiencing depressive symptoms



The association between depressive symptoms and perceptions and attitudes to social touch do not find the social aspect of affective touch pleasurable, as shown in this study, self-touch may be of interest to explore as an alternative approach.

Ethics of touch and the use of touch in mental health settings need to be considered. Touch may impact the power dynamics within a therapeutic relationship, the clinical appropriateness of the use of touch needs to be considered and how touch may be interpreted by a client and the potential for sexual exploitation of clients (Zur, 2007). In 1993, Kertay and Rev outlined suggestions for the use of touch in psychotherapy. They suggested a rigid, 'rule-bound approach'. More recently, Hugill (2019) provided clear guidance on how touch can be used within the therapeutic setting. Considering the field of clinical psychology specifically, Hugill (2019) advised practitioners to consider their theoretical standpoint, cultural considerations that need to be explored, gender of practitioner and client, how touch might be perceived by the practitioner and client, any power issues that the use of touch may bring up and to seek guidance within supervision. With regards to how to manage the topic of touch with a client, Hugill (2019) advised setting clear boundaries of touch and addressing any physical contact when it occurs. McGrane (2019) highlighted that touch can be powerful within a therapeutic setting, however an understanding of whether touch can be a necessary tool in a client's recovery needs to be sought. McGrane argued that the ethics and boundaries of touch within the therapeutic relationship need to be considered by both the client and the therapist if touch is to be used.

## **Limitations and Future Research**

In this study, participants were predominantly Caucasian and female. This creates limitations on the generalisability of the findings in a multi-ethnic population, for example the United Kingdom where the study took place. The ethnicity of the individuals in the touch videos (Appendix 2.7) are also limitations of this study. The individuals giving and receiving touch in the videos were Caucasian and, although the majority of the participants were Caucasian, the videos are not diverse and therefore not representative of a multi-ethnic society. If individuals

The association between depressive symptoms and perceptions and attitudes to social touch receiving the touch in the videos aren't of the same ethnicity, or gender, it could potentially impact the pleasantness ratings as participants may experience a lack of relatability, be influenced by their experiences of the gender and ethnicity of the individuals in the videos and impact the pleasantness ratings. The question that follows the video task includes the word 'pleasant'. This question could potentially have influenced the way in which participants responded as it is found that leading questions can result in bias answers (Semin & Poot, 1997). This could have been potentially moderated by asking participants how they felt watching the touch, however, this would not provide the information the research question was interested in. Other responses could have also been asked about, such as 'irritability', however, this could have also caused bias in participants response.

Another limitation when considering touch longing in this study is the process in which touch longing is obtained. In the LITPQ measure Bessler et al., 2020, participants were required to report the number of touch experiences for varying types of touch and with varying interaction partners. When computing the final touch longing score, however, this detail is lost. Retaining this detail in the data means that we could have a greater understanding of touch longing. For example, the source of touch could be separated, in order to see whether people are longing for familiar, but maybe not unfamiliar, touch.

It is recommended that future research explores affective touch in a society that is not touch restricted. Future research should consider the ethnicity and gender of the touch provider and aim for this to be more representative of the population in which the study is taking place. It would also be fascinating to replicate this study applying affective touch directly, to explore whether depressive symptoms impact on the pleasantness perceived when the touch is directly experienced.

## **Conclusion**

To conclude, it was hypothesised that greater depressive symptoms would be associated with reduced pleasantness ratings, especially for stroking in the affective CT-

The association between depressive symptoms and perceptions and attitudes to social touch optimal range (1-10cm/s) and CT-innervated location (forearm) (Hypothesis 1). Hypothesis 1 was partially supported as greater depressive symptoms were associated with reduced pleasantness ratings but only in relation to velocity, not location. The higher the depression, the lower the perceived pleasantness across all the velocities, but especially for the fastest non-CT-optimal velocity. As previous studies have demonstrated, the more pleasant affective touch is perceived, the more it is wanted (Løseth et al., 2019; Perini et al., 2015) and, therefore, it was hypothesised that greater depressive symptoms would be associated with a lower longing for touch (Hypothesis 2). An association between depression and touch longing was found, however, when general loss of pleasure and touch experiences and attitudes were controlled for, this association was no longer significant, therefore disproving hypothesis 2. A longing for touch is better explained by experiences or exposure to touch and also by a general loss of pleasure participants more than depressive symptoms.

## Chapter II References

- American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). <https://doi.org/10.1176/appi.books.9780890425596>
- Atherton, B. D., Nevels, R. M., & Moore, M. T. (2015). Predicting Symptoms of Depression From Social Anhedonia and Emotion Regulation. *Journal of Nervous and Mental Disease, 203*(3), 170–174. <https://doi.org/10.1097/nmd.0000000000000262>
- Barnett, L. (2005). Keep in touch: The importance of touch in infant development. *Infant Observation, 8*(2), 115–123. <https://doi.org/10.1080/13698030500171530>
- Beck, A. T., Steer, R. A., & Brown, G. (1996). *Beck Depression Inventory-II*. American Psychological Association (APA). <https://doi.org/10.1037/t00742-000>
- Beßler, R., Bendas, J., Sailer, U., & Croy, I. (2020). The “Longing for Interpersonal Touch Picture Questionnaire”: Development of a new measurement for touch perception. *International Journal of Psychology, 55*(3), 446–455. <https://doi.org/10.1002/ijop.12616>
- Boivin, M., Hymel, S., & Bukowski, W. M. (1995). The roles of social withdrawal, peer rejection, and victimization by peers in predicting loneliness and depressed mood in childhood. *Development and Psychopathology, 7*(4), 765–785. <https://doi.org/10.1017/s0954579400006830>
- Bora, E., & Berk, M. (2016). Theory of mind in major depressive disorder: A meta-analysis. *Journal of Affective Disorders, 191*, 49–55. <https://doi.org/10.1016/j.jad.2015.11.023>
- Brauer, J., Xiao, Y., Friederici, A., Poulain, T., & Schirmer, A. (2016). Frequency of Maternal Touch Predicts Resting Activity and Connectivity of the Developing Social Brain. *Cerebral Cortex, 26*(8). <https://doi.org/10.1093/cercor/bhw137>
- Clark, C. B., Thorne, C. B., Hardy, S., & Cropsey, K. L. (2013). Cooperation and depressive symptoms. *Journal of Affective Disorders, 150*(3), 1184–1187. <https://doi.org/10.1016/j.jad.2013.05.011>
- Coan, J. A., Schaefer, H. S., & Davidson, R. J. (2006). Lending a Hand. *Psychological Science, 17*(12), 1032–1039. <https://doi.org/10.1111/j.1467-9280.2006.01832.x>

The association between depressive symptoms and perceptions and attitudes to social touch

Croy, I., Luong, A., Triscoli, C., Hofmann, E., Olausson, H., & Sailer, U. (2016). Interpersonal stroking touch is targeted to C tactile afferent activation. *Behavioural Brain Research*, 297, 37–40. <https://doi.org/10.1016/j.bbr.2015.09.038>

Croy, Ilona, Geide, H., Paulus, M., Weidner, K., & Olausson, H. (2016). Affective touch awareness in mental health and disease relates to autistic traits – An explorative neurophysiological investigation. *Psychiatry Research*, 245, 491–496. <https://doi.org/10.1016/j.psychres.2016.09.011>

Crucianelli, L., Cardi, V., Treasure, J., Jenkinson, P. M., & Fotopoulou, A. (2016). The perception of affective touch in anorexia nervosa. *Psychiatry Research*, 239, 72–78. <https://doi.org/10.1016/j.psychres.2016.01.078>

Dalili, M. N., Penton-Voak, I. S., Harmer, C. J., & Munafò, M. R. (2014). Meta-analysis of emotion recognition deficits in major depressive disorder. *Psychological Medicine*, 45(6), 1135–1144. <https://doi.org/10.1017/s0033291714002591>

De-Fruyt, J., Sabbe, B., & Demyttenaere, K. (2020). Anhedonia in Depressive Disorder: A Narrative Review. *Psychopathology*, 53(5–6), 274–281. <https://doi.org/10.1159/000508773>

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>

Donges, U.-S., Kersting, A., Dannlowski, U., Lalee-Mentzel, J., Arolt, V., & Suslow, T. (2005). Reduced Awareness of Others' Emotions in Unipolar Depressed Patients. *Journal of Nervous and Mental Disease*, 193(5), 331–337. <https://doi.org/10.1097/01.nmd.0000161683.02482.19>

Dunbar, R. I. M. (2010). The social role of touch in humans and primates: Behavioural function and neurobiological mechanisms. *Neuroscience and Biobehavioral Reviews*, 34(2), 260–268. <https://doi.org/10.1016/j.neubiorev.2008.07.001>

Eckstein, M., Mamaev, I., Ditzen, B., & Sailer, U. (2020). Calming Effects of Touch in Human, Animal, and Robotic Interaction Scientific State-of-the-Art and Technical

The association between depressive symptoms and perceptions and attitudes to social touch

Advances. *Frontiers in Psychiatry*, 11. <https://doi.org/10.3389/fpsy.2020.555058>

Ehnavall, A., Mitchell, P. B., Hadzi-Pavlovic, D., Parker, G., Frankland, A., Loo, C.,

Breakspear, M., Wright, A., Roberts, G., Lau, P., & Perich, T. (2014). Rejection sensitivity and pain in bipolar versus unipolar depression. *Bipolar Disorders*, 16(2), 190–198. <https://doi.org/10.1111/bdi.12147>

Ferguson, H. J., & Cane, J. (2017). Tracking the impact of depression in a perspective-taking task. *Scientific Reports*, 7(1). <https://doi.org/10.1038/s41598-017-13922-y>

Field, T. (2002). Massage therapy. *Medical Clinics of North America*, 86(1), 163–171. [https://doi.org/10.1016/s0025-7125\(03\)00078-6](https://doi.org/10.1016/s0025-7125(03)00078-6)

Field, T. (2010). Touch for socioemotional and physical well-being: A review. *Developmental Review*, 30(4), 367–383. <https://doi.org/10.1016/j.dr.2011.01.001>

Field, T. (2016). Massage therapy research review. *Complementary Therapies in Clinical Practice*, 24, 19–31. <https://doi.org/https://doi.org/10.1016/j.ctcp.2016.04.005>

Field, T., Diego, M., & Hernandez-Reif, M. (2007). Massage therapy research. *Developmental Review*, 27(1), 75–89. <https://doi.org/10.1016/j.dr.2005.12.002>

Field, T., Grizzle, N., Scafidi, F., Abrams, S., Richardson, S., Kuhn, C., & Schanberg, S. (1996). Massage therapy for infants of depressed mothers. *Infant Behavior and Development*, 19(1), 107–112. [https://doi.org/10.1016/s0163-6383\(96\)90048-x](https://doi.org/10.1016/s0163-6383(96)90048-x)

Field, T., Morrow, C., Valdeon, C., Larson, S., Kuhn, C., & Schanberg, S. (1992). Massage Reduces Anxiety in Child and Adolescent Psychiatric Patients. *Journal of the American Academy of Child and Adolescent Psychiatry*, 31(1), 125–131. <https://doi.org/10.1097/00004583-199201000-00019>

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>

Fischer-Kern, M., Fonagy, P., Kapusta, N. D., Luyten, P., Boss, S., Naderer, A., Blüml, V., & Leithner, K. (2013). Mentalizing in Female Inpatients With Major Depressive Disorder. *Journal of Nervous and Mental Disease*, 201(3), 202–207.

The association between depressive symptoms and perceptions and attitudes to social touch

<https://doi.org/10.1097/nmd.0b013e3182845c0a>

Franken, I. H. A., Rassin, E., & Muris, P. (2007). The assessment of anhedonia in clinical and non-clinical populations: Further validation of the Snaith Hamilton Pleasure Scale (SHAPS). *Journal of Affective Disorders*, *99*(1–3), 83–89.

<https://doi.org/10.1016/j.jad.2006.08.020>

Gallace, A., & Spence, C. (2010). The science of interpersonal touch: An overview.

*Neuroscience and Biobehavioral Reviews*, *34*(2), 246–259.

<https://doi.org/10.1016/j.neubiorev.2008.10.004>

Golder, D. J. (1993). The Power of Touch. *AJN, American Journal of Nursing*, *93*(6), 88.

<https://doi.org/10.1097/00000446-199306000-00038>

Hayes, J. A. (1998). Pharmacological Stroking Intervention for Premature Infants. *Nursing*.

Haynes, A. C., Lywood, A., Crowe, E. M., Fielding, J. L., Rossiter, J. M., & Kent, C. (2022). A calming hug: Design and validation of a tactile aid to ease anxiety. *PLOS ONE*, *17*(3), e0259838.

<https://doi.org/10.1371/journal.pone.0259838>

Hernandez-Reif, M., Dieter, J., Field, T., Swerdlow, B., & Diego, M. (1998). Migraine

Headaches are Reduced by Massage Therapy. *International Journal of Neuroscience*, *96*(1–2), 1–11. <https://doi.org/10.3109/00207459808986453>

Hernandez-Reif, M., Field, T., Krasnegor, J., & Theakston, H. (2001). Lower Back Pain is

Reduced and Range of Motion Increased After Massage Therapy. *International Journal of Neuroscience*, *106*(3–4), 131–145. <https://doi.org/10.3109/00207450109149744>

Hertenstein, M. J., Verkamp, J. M., Kerestes, A. M., & Holmes, R. M. (2006). The

Communicative Functions of Touch in Humans, Nonhuman Primates, and Rats: A Review and Synthesis of the Empirical Research. *Genetic, Social, and General Psychology Monographs*, *132*(1), 5–94. <https://doi.org/10.3200/mono.132.1.5-94>

Hugill, M. (2019). The power of touch: Considering touch and physical contact within a therapeutic relationship. In *Professional Issues in Clinical Psychology* (pp. 11-18).

Routledge.

Jaeger, J., Berns, S., Uzelac, S., & Davis-Conway, S. (2006). Neurocognitive deficits and

- The association between depressive symptoms and perceptions and attitudes to social touch disability in major depressive disorder. *Psychiatry Research*, 145(1), 39–48.  
<https://doi.org/10.1016/j.psychres.2005.11.011>
- Kertay, L., & Reviere, S. L. (1993). The use of touch in psychotherapy: Theoretical and ethical considerations. *Psychotherapy: Theory, Research, Practice, Training*, 30(1), 32.  
<https://doi.org/10.1037/0033-3204.30.1.32>
- Kirsch, L., Crucianelli, L., Fotopoulou, A., Krahé, C., Blom, N., Jenkinson, P., & Moro, V. (2018). Reading the mind in the touch: Neurophysiological specificity in the communication of emotions by touch. *Neuropsychologia*, 116.  
<https://doi.org/10.1016/j.neuropsychologia.2017.05.024>
- Krahé, C., von Mohr, M., Gentsch, A., Guy, L., Vari, C., Nolte, T., & Fotopoulou, A. (2018). Sensitivity to CT-optimal, Affective Touch Depends on Adult Attachment Style. *Scientific Reports*, 8(1), 1–10. <https://doi.org/10.1038/s41598-018-32865-6>
- Kupferberg, A., Bicks, L., & Hasler, G. (2016). Social functioning in major depressive disorder. *Neuroscience and Biobehavioral Reviews*, 69, 313–332.  
<https://doi.org/10.1016/j.neubiorev.2016.07.002>
- Kupferberg, A., Hager, O. M., Fischbacher, U., Brändle, L. S., Haynes, M., & Hasler, G. (2016). Testing the social competition hypothesis of depression using a simple economic game. *BJPsych Open*, 2(2), 163–169.  
<https://doi.org/10.1192/bjpo.bp.115.001362>
- Kurebayashi, L. F. S., Turrini, R. N. T., de Souza, T. P. B., Takiguchi, R. S., Kuba, G., & Nagumo, M. T. (2016). Massage and reiki used to reduce stress and anxiety: Randomized clinical trial. *Revista Latino-Americana de Enfermagem*, 24.  
<https://doi.org/10.1590/1518-8345.1614.2834>
- 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. <https://doi.org/10.1038/nn.2312>
- Løseth, G. E., Eikemo, M., & Leknes, S. (2019). Effects of opioid receptor stimulation and blockade on touch pleasantness: A double-blind randomised trial. *Social Cognitive and*



- The association between depressive symptoms and perceptions and attitudes to social touch  
*Affective Neuroscience*, 14(4), 411–422. <https://doi.org/10.1093/scan/nsz022>
- McCall, W. V., & Dunn, A. G. (2003). Cognitive deficits are associated with functional impairment in severely depressed patients. *Psychiatry Research*, 121(2), 179–184. <https://doi.org/10.1016/j.psychres.2003.09.003>
- McGlone, F., Olausson, H., Boyle, J. A., Jones-Gotman, M., Dancer, C., Guest, S., & Essick, G. (2012). Touching and feeling: differences in pleasant touch processing between glabrous and hairy skin in humans. *European Journal of Neuroscience*, 35(11), 1782–1788. <https://doi.org/10.1111/j.1460-9568.2012.08092.x>
- McGlone, Francis, Vallbo, A. B., Olausson, H., Loken, L., & Wessberg, J. (2007). Discriminative touch and emotional touch. *Canadian Journal of Experimental Psychology/Revue Canadienne de Psychologie Expérimentale*, 61(3), 173–183. <https://doi.org/10.1037/cjep2007019>
- McGlone, Francis, Wessberg, J., & Olausson, H. (2014). Discriminative and Affective Touch: Sensing and Feeling. *Neuron*, 82(4), 737–755. <https://doi.org/10.1016/j.neuron.2014.05.001>
- McGrane, C. (2019). An exploration on the use of touch in the therapeutic relationship.
- Morrison, I., Björnsdotter, 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., Löken, L. S., & Olausson, H. (2010). The skin as a social organ. *Experimental Brain Research*, 204(3), 305–314. <https://doi.org/10.1007/s00221-009-2007-y>
- Muscroft, J., & Bowl, R. (2000). The impact of depression on caregivers and other family members: Implications for professional support. *Counselling Psychology Quarterly*, 13(1), 117–134. <https://doi.org/10.1080/09515070050011105>
- Nakonezny, P. A., Carmody, T. J., Morris, D. W., Kurian, B. T., & Trivedi, M. H. (2010). Psychometric evaluation of the Snaith-Hamilton pleasure scale in adult outpatients with major depressive disorder. *International Clinical Psychopharmacology*, 25(6), 328–333. <https://doi.org/10.1097/yic.0b013e32833eb5ee>

- The association between depressive symptoms and perceptions and attitudes to social touch
- National Institute for Health and Care Excellence. (2019). *Depression: the NICE guideline on the treatment and management of depression in adults*. National C.  
<http://www.nice.org.uk>
- Nezlek, J. B., Hampton, C. P., & Shean, G. D. (2000). Clinical depression and day-to-day social interaction in a community sample. *Journal of Abnormal Psychology, 109*(1), 11–19. <https://doi.org/10.1037/0021-843x.109.1.11>
- Nezlek, J. B., Imbrie, M., & Shean, G. D. (1994). Depression and everyday social interaction. *Journal of Personality and Social Psychology, 67*(6), 1101–1111.  
<https://doi.org/10.1037/0022-3514.67.6.1101>
- Nordin, M. (1990). Low-threshold mechanoreceptive and nociceptive units with unmyelinated (C) fibres in the human supraorbital nerve. *The Journal of Physiology, 426*(1), 229–240.  
<https://doi.org/10.1113/jphysiol.1990.sp018135>
- Okamoto. (2005). *Letter to the Editor The effect of aromatherapy massage on mild depression : November 2004*, 13162005.
- Pelizza, L., & Ferrari, A. (2009). Anhedonia in schizophrenia and major depression: state or trait? *Annals of General Psychiatry, 8*(1). <https://doi.org/10.1186/1744-859x-8-22>
- Perini, I., Olausson, H., & Morrison, I. (2015). Seeking pleasant touch: Neural correlates of behavioral preferences for skin stroking. *Frontiers in Behavioral Neuroscience, 9*(FEB), 1–9. <https://doi.org/10.3389/fnbeh.2015.00008>
- Piper, H., & Stronach, I. (2008). Don't touch. *The educational story of a panic*. New York.
- Porcelli, S., Wee, N. Van Der, van der Werff, S., Aghajani, M., Glennon, J. C., van Heukelum, S., Mogavero, F., Lobo, A., Olivera, F. J., Lobo, E., Posadas, M., Dukart, J., Kozak, R., Arce, E., Ikram, A., Vorstman, J., Bilderbeck, A., Saris, I., Kas, M. J., & Serretti, A. (2019). Social brain, social dysfunction and social withdrawal. *Neuroscience and Biobehavioral Reviews, 97*, 10–33. <https://doi.org/10.1016/j.neubiorev.2018.09.012>
- Radke, S., Schäfer, I. C., Müller, B. W., & de Bruijn, E. R. A. (2013). Do different fairness contexts and facial emotions motivate 'irrational' social decision-making in major depression? An exploratory patient study. *Psychiatry Research, 210*(2), 438–443.

- The association between depressive symptoms and perceptions and attitudes to social touch  
<https://doi.org/10.1016/j.psychres.2013.07.017>
- Rapaport, M. H., Schettler, P., Larson, E. R., Edwards, S. A., Dunlop, B. W., Rakofsky, J. J., & Kinkead, B. (2016). Acute Swedish massage monotherapy successfully remediates symptoms of generalized anxiety disorder: A proof-of-concept, randomized controlled study. *Journal of Clinical Psychiatry, 77*(7), e883–e891.  
<https://doi.org/10.4088/JCP.15m10151>
- Rey, G., Jouvent, R., & Dubal, S. (2009). Schizotypy, depression, and anxiety in physical and social anhedonia. *Journal of Clinical Psychology, 65*(7), 695–708.  
<https://doi.org/10.1002/jclp.20577>
- Sailer, U., & Ackerley, R. (2019). Exposure shapes the perception of affective touch. *Developmental Cognitive Neuroscience, 35*(August 2017), 109–114.  
<https://doi.org/10.1016/j.dcn.2017.07.008>
- Salzmann-Erikson, M., & Eriksson, H. (2005). Encountering Touch: A Path To Affinity In Psychiatric Care. *Issues in Mental Health Nursing, 26*(8), 843–852.  
<https://doi.org/10.1080/01612840500184376>
- Schirmer, A., Croy, I., & Schweinberger, S. R. (2022). Social touch — a tool rather than a signal. *Current Opinion in Behavioral Sciences, 44*, 1–5.  
<https://doi.org/10.1016/j.cobeha.2021.101100>
- Sehlstedt, I., Ignell, H., Wasling, H., Ackerley, R., Olausson, H., & Croy, I. (2016). Gentle touch perception across the lifespan. *Psychology and Aging, 31*(2).  
<https://doi.org/10.1037/pag0000074>
- Semin, G. R., & De Poot, C. J. (1997). The question–answer paradigm: You might regret not noticing how a question is worded. *Journal of Personality and Social Psychology, 73*(3), 472.
- Slavich, G. M., O'Donovan, A., Epel, E. S., & Kemeny, M. E. (2010). Black sheep get the blues: A psychobiological model of social rejection and depression. *Neuroscience and Biobehavioral Reviews, 35*(1), 39–45. <https://doi.org/10.1016/j.neubiorev.2010.01.003>
- Snaith, R. P., Hamilton, M., Morley, S., Humayan, A., Hargreaves, D., & Trigwell, P. (1995).

- The association between depressive symptoms and perceptions and attitudes to social touch  
A scale for the assessment of hedonic tone. The Snaith-Hamilton Pleasure Scale.  
*British Journal of Psychiatry*, 167(JULY), 99–103. <https://doi.org/10.1192/bjp.167.1.99>
- Strauss, T., Rottstädt, F., Sailer, U., Schellong, J., Hamilton, J. P., Raue, C., Weidner, K., & Croy, I. (2019). Touch aversion in patients with interpersonal traumatization.  
*Depression and Anxiety*, 36(7), 635–646. <https://doi.org/10.1002/da.22914>
- Suvilehto, J. T., Glerean, E., Dunbar, R. I. M., Hari, R., & Nummenmaa, L. (2015).  
Topography of social touching depends on emotional bonds between humans.  
*Proceedings of the National Academy of Sciences*, 112(45), 13811–13816.  
<https://doi.org/10.1073/pnas.1519231112>
- Tricoli, C., Croy, I., & Sailer, U. (2019). Depression predicts interpersonal problems partially through the attitude towards social touch. *Journal of Affective Disorders*, 246(December 2018), 234–240. <https://doi.org/10.1016/j.jad.2018.12.054>
- Trotter, P. D., McGlone, F., Reniers, R. L. E. P., & Deakin, J. F. W. (2018). Construction and Validation of the Touch Experiences and Attitudes Questionnaire (TEAQ): A Self-report Measure to Determine Attitudes Toward and Experiences of Positive Touch. In *Journal of Nonverbal Behavior* (Vol. 42, Issue 4). Springer US. <https://doi.org/10.1007/s10919-018-0281-8>
- Trotter, Paula Diane, McGlone, F., McKie, S., McFarquhar, M., Elliott, R., Walker, S. C., & Deakin, J. F. W. (2016). Effects of acute tryptophan depletion on central processing of CT-targeted and discriminatory touch in humans. *European Journal of Neuroscience*, 44(4), 2072–2083. <https://doi.org/10.1111/ejn.13298>
- Tse, W. S., & Bond, A. J. (2004). The Impact of Depression on Social Skills. *Journal of Nervous and Mental Disease*, 192(4), 260–268.  
<https://doi.org/10.1097/01.nmd.0000120884.60002.2b>
- Vallbo, Å. B., Olausson, H., & Wessberg, J. (1999). Unmyelinated Afferents Constitute a Second System Coding Tactile Stimuli of the Human Hairy Skin. *Journal of Neurophysiology*, 81(6), 2753–2763. <https://doi.org/10.1152/jn.1999.81.6.2753>
- Vallbo, A., Olausson, H., Wessberg, J., & Norrsell, U. (1993). A system of unmyelinated

- The association between depressive symptoms and perceptions and attitudes to social touch afferents for innocuous mechanoreception in the human skin. *Brain Research*, 628(1–2), 301–304. [https://doi.org/10.1016/0006-8993\(93\)90968-s](https://doi.org/10.1016/0006-8993(93)90968-s)
- Verkamp, J. M., Kerestes, A. M., Holmes, R. M., & Hertenstein, M. J. (2006). The communicative functions of touch in humans, nonhuman primates, and rats: a review and synthesis of the empirical research. *Genetic, Social, and General Psychology Monographs*, 132(1), 5–94. <http://www.ncbi.nlm.nih.gov/pubmed/17345871>
- 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). <https://doi.org/10.1038/s41598-017-13355-7>
- Walker, S. C., Trotter, P. D., Woods, A., & McGlone, F. (2017). Vicarious ratings of social touch reflect the anatomical distribution & velocity tuning of C-tactile afferents: A hedonic homunculus? *Behavioural Brain Research*, 320, 91–96. <https://doi.org/10.1016/j.bbr.2016.11.046>
- Wolkenstein, L., Schönenberg, M., Schirm, E., & Hautzinger, M. (2011). I can see what you feel, but I can't deal with it: Impaired theory of mind in depression. *Journal of Affective Disorders*, 132(1–2), 104–111. <https://doi.org/10.1016/j.jad.2011.02.010>
- World Health Organisation. (2017). *Depression and other common mental disorders*. <http://www.who.int>
- Yang, X., Yuan, X., Liu, G., & Harrision, P. (2020). The Specific Roles of Loss of Interest and Loss of Pleasure in Recent Suicidal Ideation. *Archives of Suicide Research*, 1–10. <https://doi.org/10.1080/13811118.2020.1838981>

## Appendix 1: Appendices for Chapter I

### Appendix 1.1 Search Terms

### Appendix 1.2 Quality Assessment Tool for Quantitative Studies

#### Appendix 1.1: Search Terms

##### ProQuest (PsychInfo):

1. touch\* OR massag\* OR hug OR hugging OR stroking OR "affective touch"
2. therap\* OR treat\* OR counsel\* OR psychotherap\*
3. "low mood" OR depress\* OR anxi\* OR anxiety
4. Stroke
5. 1 AND 2 AND 3
6. 5 NOT 4

##### ProQuest (MEDLINE):

1. touch\* OR massag\* OR hug OR hugging OR stroking OR "affective touch"
2. therap\* OR treat\* OR counsel\* OR psychotherap\*
3. "low mood" OR depress\* OR anxi\* OR anxiety
4. Stroke
5. 1 AND 2 AND 3
6. 5 NOT 4

##### PubMed

1. touch\* OR massag\* OR hug OR hugging OR stroking OR "affective touch"
2. therap\* OR treat\* OR counsel\* OR psychotherap\*
3. "low mood" OR depress\* OR anxi\* OR anxiety
4. Stroke
5. 1 AND 2 AND 3
6. 5 NOT 4

##### Web of science:

TS = (touch\* OR massag\* OR hug OR hugging OR stroking OR "affective touch") AND TS = (therap\* OR treat\* OR counsel\* OR psychotherap\*) AND TS = ("low mood" OR depress\* OR anxi\* OR anxiety) NOT TS = (stroke)

**Appendix 1.2: Quality Assessment Tool for Quantitative Studies**

**QUALITY ASSESSMENT TOOL FOR QUANTITATIVE STUDIES**



**COMPONENT RATINGS**

**A) SELECTION BIAS**

**(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?**

- 1 Very likely
- 2 Somewhat likely
- 3 Not likely
- 4 Can't tell

**(Q2) What percentage of selected individuals agreed to participate?**

- 1 80 - 100% agreement
- 2 60 – 79% agreement
- 3 less than 60% agreement
- 4 Not applicable
- 5 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**B) STUDY DESIGN**

**Indicate the study design**

- 1 Randomized controlled trial
- 2 Controlled clinical trial
- 3 Cohort analytic (two group pre + post)
- 4 Case-control
- 5 Cohort (one group pre + post (before and after))
- 6 Interrupted time series
- 7 Other specify \_\_\_\_\_
- 8 Can't tell

**Was the study described as randomized? If NO, go to Component C.**

- No
- Yes

**If Yes, was the method of randomization described? (See dictionary)**

- No
- Yes

**If Yes, was the method appropriate? (See dictionary)**

- No
- Yes

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**C) CONFOUNDERS**

**(Q1) Were there important differences between groups prior to the intervention?**

- 1 Yes
- 2 No
- 3 Can't tell

**The following are examples of confounders:**

- 1 Race
- 2 Sex
- 3 Marital status/family
- 4 Age
- 5 SES (income or class)
- 6 Education
- 7 Health status
- 8 Pre-intervention score on outcome measure

**(Q2) If yes, indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?**

- 1 80 – 100% (most)
- 2 60 – 79% (some)
- 3 Less than 60% (few or none)
- 4 Can't Tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**D) BLINDING**

**(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?**

- 1 Yes
- 2 No
- 3 Can't tell

**(Q2) Were the study participants aware of the research question?**

- 1 Yes
- 2 No
- 3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**E) DATA COLLECTION METHODS**

**(Q1) Were data collection tools shown to be valid?**

- 1 Yes
- 2 No
- 3 Can't tell

**(Q2) Were data collection tools shown to be reliable?**

- 1 Yes
- 2 No
- 3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3



The association between depressive symptoms and perceptions and attitudes to social touch

**GLOBAL RATING**

**COMPONENT RATINGS**

Please transcribe the information from the gray boxes on pages 1-4 onto this page. See dictionary on how to rate this section.

<b>A</b>	<b>SELECTION BIAS</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>	
		1	2	3	
<b>B</b>	<b>STUDY DESIGN</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>	
		1	2	3	
<b>C</b>	<b>CONFOUNDERS</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>	
		1	2	3	
<b>D</b>	<b>BLINDING</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>	
		1	2	3	
<b>E</b>	<b>DATA COLLECTION METHOD</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>	
		1	2	3	
<b>F</b>	<b>WITHDRAWALS AND DROPOUTS</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>	
		1	2	3	Not Applicable

**GLOBAL RATING FOR THIS PAPER (circle one):**

- |   |          |                            |
|---|----------|----------------------------|
| 1 | STRONG   | (no WEAK ratings)          |
| 2 | MODERATE | (one WEAK rating)          |
| 3 | WEAK     | (two or more WEAK ratings) |

With both reviewers discussing the ratings:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

- No      Yes

If yes, indicate the reason for the discrepancy

- |   |   |
|---|---|
| 1 | Oversight                                 |
| 2 | Differences in interpretation of criteria |
| 3 | Differences in interpretation of study    |

**Final decision of both reviewers (circle one):**

- |          |                 |
|----------|-----------------|
| <b>1</b> | <b>STRONG</b>   |
| <b>2</b> | <b>MODERATE</b> |
| <b>3</b> | <b>WEAK</b>     |

The association between depressive symptoms and perceptions and attitudes to social touch

**GLOBAL RATING**

**COMPONENT RATINGS**

Please transcribe the information from the gray boxes on pages 1-4 onto this page. See dictionary on how to rate this section.

<b>A</b>	<b>SELECTION BIAS</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>B</b>	<b>STUDY DESIGN</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>C</b>	<b>CONFOUNDERS</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>D</b>	<b>BLINDING</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>E</b>	<b>DATA COLLECTION METHOD</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>F</b>	<b>WITHDRAWALS AND DROPOUTS</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
				Not Applicable

**GLOBAL RATING FOR THIS PAPER (circle one):**

- 1      STRONG                      (no WEAK ratings)
- 2      MODERATE                    (one WEAK rating)
- 3      WEAK                              (two or more WEAK ratings)

With both reviewers discussing the ratings:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

- No      Yes

If yes, indicate the reason for the discrepancy

- 1      Oversight
- 2      Differences in interpretation of criteria
- 3      Differences in interpretation of study

**Final decision of both reviewers (circle one):**

- 1      STRONG**
- 2      MODERATE**
- 3      WEAK**

## Quality Assessment Tool for Quantitative Studies Dictionary



The purpose of this dictionary is to describe items in the tool thereby assisting raters to score study quality. Due to under-reporting or lack of clarity in the primary study, raters will need to make judgements about the extent that bias may be present. When making judgements about each component, raters should form their opinion based upon information contained in the study rather than making inferences about what the authors intended.

### A) SELECTION BIAS

**(Q1)** Participants are more likely to be representative of the target population if they are randomly selected from a comprehensive list of individuals in the target population (score very likely). They may not be representative if they are referred from a source (e.g. clinic) in a systematic manner (score somewhat likely) or self-referred (score not likely).

**(Q2)** Refers to the % of subjects in the control and intervention groups that agreed to participate in the study before they were assigned to intervention or control groups.

### B) STUDY DESIGN

In this section, raters assess the likelihood of bias due to the allocation process in an experimental study. For observational studies, raters assess the extent that assessments of exposure and outcome are likely to be independent. Generally, the type of design is a good indicator of the extent of bias. In stronger designs, an equivalent control group is present and the allocation process is such that the investigators are unable to predict the sequence.

#### Randomized Controlled Trial (RCT)

An experimental design where investigators randomly allocate eligible people to an intervention or control group. A rater should describe a study as an RCT if the randomization sequence allows each study participant to have the same chance of receiving each intervention and the investigators could not predict which intervention was next. If the investigators do not describe the allocation process and only use the words 'random' or 'randomly', the study is described as a controlled clinical trial.

See below for more details.

*Was the study described as randomized?*

Score YES, if the authors used words such as random allocation, randomly assigned, and random assignment.

Score NO, if no mention of randomization is made.

*Was the method of randomization described?*

Score YES, if the authors describe any method used to generate a random allocation sequence.

Score NO, if the authors do not describe the allocation method or describe methods of allocation such as alternation, case record numbers, dates of birth, day of the week, and any allocation procedure that is entirely transparent before assignment, such as an open list of random numbers of assignments.

If NO is scored, then the study is a controlled clinical trial.

## The association between depressive symptoms and perceptions and attitudes to social touch

### *Was the method appropriate?*

Score YES, if the randomization sequence allowed each study participant to have the same chance of receiving each intervention and the investigators could not predict which intervention was next. Examples of appropriate approaches include assignment of subjects by a central office unaware of subject characteristics, or sequentially numbered, sealed, opaque envelopes.

Score NO, if the randomization sequence is open to the individuals responsible for recruiting and allocating participants or providing the intervention, since those individuals can influence the allocation process, either knowingly or unknowingly.

If NO is scored, then the study is a controlled clinical trial.

### Controlled Clinical Trial (CCT)

An experimental study design where the method of allocating study subjects to intervention or control groups is open to individuals responsible for recruiting subjects or providing the intervention. The method of allocation is transparent before assignment, e.g. an open list of random numbers or allocation by date of birth, etc.

### Cohort analytic (two group pre and post)

An observational study design where groups are assembled according to whether or not exposure to the intervention has occurred. Exposure to the intervention is not under the control of the investigators. Study groups might be non-equivalent or not comparable on some feature that affects outcome.

### Case control study

A retrospective study design where the investigators gather 'cases' of people who already have the outcome of interest and 'controls' who do not. Both groups are then questioned or their records examined about whether they received the intervention exposure of interest.

### Cohort (one group pre + post (before and after))

The same group is pretested, given an intervention, and tested immediately after the intervention. The intervention group, by means of the pretest, act as their own control group.

### Interrupted time series

A time series consists of multiple observations over time. Observations can be on the same units (e.g. individuals over time) or on different but similar units (e.g. student achievement scores for particular grade and school). Interrupted time series analysis requires knowing the specific point in the series when an intervention occurred.

## **C) CONFOUNDERS**

By definition, a confounder is a variable that is associated with the intervention or exposure and causally related to the outcome of interest. Even in a robust study design, groups may not be balanced with respect to important variables prior to the intervention. The authors should indicate if confounders were controlled in the design (by stratification or matching) or in the analysis. If the allocation to intervention and control groups is randomized, the authors must report that the groups were balanced at baseline with respect to confounders (either in the text or a table).

## **D) BLINDING**

(Q1) Assessors should be described as blinded to which participants were in the control and intervention groups. The purpose of blinding the outcome assessors (who might also be the care providers) is to protect against detection bias.

(Q2) Study participants should not be aware of (i.e. blinded to) the research question. The purpose of blinding the participants is to protect against reporting bias.

**E) DATA COLLECTION METHODS**

Tools for primary outcome measures must be described as reliable and valid. If 'face' validity or 'content' validity has been demonstrated, this is acceptable. Some sources from which data may be collected are described below:

Self reported data includes data that is collected from participants in the study (e.g. completing a questionnaire, survey, answering questions during an interview, etc.).

Assessment/Screening includes objective data that is retrieved by the researchers. (e.g. observations by investigators).

Medical Records/Vital Statistics refers to the types of formal records used for the extraction of the data.

**Reliability and validity can be reported in the study or in a separate study. For example, some standard assessment tools have known reliability and validity.**

**F) WITHDRAWALS AND DROP-OUTS**

Score **YES** if the authors describe BOTH the numbers and reasons for withdrawals and drop-outs.

Score **NO** if either the numbers or reasons for withdrawals and drop-outs are not reported.

The percentage of participants completing the study refers to the % of subjects remaining in the study at the final data collection period in all groups (i.e. control and intervention groups).

**G) INTERVENTION INTEGRITY**

The number of participants receiving the intended intervention should be noted (consider both frequency and intensity). For example, the authors may have reported that at least 80 percent of the participants received the complete intervention. The authors should describe a method of measuring if the intervention was provided to all participants the same way. As well, the authors should indicate if subjects received an unintended intervention that may have influenced the outcomes. For example, co-intervention occurs when the study group receives an additional intervention (other than that intended). In this case, it is possible that the effect of the intervention may be over-estimated. Contamination refers to situations where the control group accidentally receives the study intervention. This could result in an under-estimation of the impact of the intervention.

**H) ANALYSIS APPROPRIATE TO QUESTION**

Was the quantitative analysis appropriate to the research question being asked?

An intention-to-treat analysis is one in which all the participants in a trial are analyzed according to the intervention to which they were allocated, whether they received it or not. Intention-to-treat analyses are favoured in assessments of effectiveness as they mirror the noncompliance and treatment changes that are likely to occur when the intervention is used in practice, and because of the risk of attrition bias when participants are excluded from the analysis.

### **Component Ratings of Study:**

For each of the six components A – F, use the following descriptions as a roadmap.

#### **A) SELECTION BIAS**

**Strong:** The selected individuals are very likely to be representative of the target population (Q1 is 1) **and** there is greater than 80% participation (Q2 is 1).

**Moderate:** The selected individuals are at least somewhat likely to be representative of the target population (Q1 is 1 or 2); **and** there is 60 - 79% participation (Q2 is 2). 'Moderate' may also be assigned if Q1 is 1 or 2 and Q2 is 5 (can't tell).

**Weak:** The selected individuals are not likely to be representative of the target population (Q1 is 3); **or** there is less than 60% participation (Q2 is 3) **or** selection is not described (Q1 is 4); and the level of participation is not described (Q2 is 5).

#### **B) DESIGN**

**Strong:** will be assigned to those articles that described RCTs and CCTs.

**Moderate:** will be assigned to those that described a cohort analytic study, a case control study, a cohort design, or an interrupted time series.

**Weak:** will be assigned to those that used any other method or did not state the method used.

#### **C) CONFOUNDERS**

**Strong:** will be assigned to those articles that controlled for at least 80% of relevant confounders (Q1 is 2); **or** (Q2 is 1).

**Moderate:** will be given to those studies that controlled for 60 – 79% of relevant confounders (Q1 is 1) **and** (Q2 is 2).

**Weak:** will be assigned when less than 60% of relevant confounders were controlled (Q1 is 1) **and** (Q2 is 3) **or** control of confounders was not described (Q1 is 3) **and** (Q2 is 4).

#### **D) BLINDING**

**Strong:** The outcome assessor is not aware of the intervention status of participants (Q1 is 2); **and** the study participants are not aware of the research question (Q2 is 2).

**Moderate:** The outcome assessor is not aware of the intervention status of participants (Q1 is 2); **or** the study participants are not aware of the research question (Q2 is 2); **or** blinding is not described (Q1 is 3 and Q2 is 3).

**Weak:** The outcome assessor is aware of the intervention status of participants (Q1 is 1); **and** the study participants are aware of the research question (Q2 is 1).

#### **E) DATA COLLECTION METHODS**

**Strong:** The data collection tools have been shown to be valid (Q1 is 1); **and** the data collection tools have been shown to be reliable (Q2 is 1).

**Moderate:** The data collection tools have been shown to be valid (Q1 is 1); **and** the data collection tools have not been shown to be reliable (Q2 is 2) **or** reliability is not described (Q2 is 3).

**Weak:** The data collection tools have not been shown to be valid (Q1 is 2) **or** both reliability and validity are not described (Q1 is 3 and Q2 is 3).

#### **F) WITHDRAWALS AND DROP-OUTS - a rating of:**

**Strong:** will be assigned when the follow-up rate is 80% or greater (Q2 is 1).

**Moderate:** will be assigned when the follow-up rate is 60 – 79% (Q2 is 2) **OR** Q2 is 5 (N/A).

**Weak:** will be assigned when a follow-up rate is less than 60% (Q2 is 3) or if the withdrawals and drop-outs were not described (Q2 is 4).

The association between depressive symptoms and perceptions and attitudes to social touch

## **Appendix 2: Appendices for Chapter II**

Appendix 2.1 Ethical approval from the University of Liverpool Research Review Committee

Appendix 2.2 Study advert

Appendix 2.3 Participant information sheet

Appendix 2.4 Consent form

Appendix 2.5 Demographic Questions

Appendix 2.6 BDI-II (Beck, Steer & Brown, 1996)

Appendix 2.7 Social Touch videos (Walker et al., 2017) and pleasantness rating question

Appendix 2.8 SHAPS (Snaith, 1995)

Appendix 2.9 TEAQ (Trotter, McGlone, Reniers, & Deakin, 2018)

Appendix 2.10 LITPQ (Bessler et al., 2020)

Appendix 2.11 Graph showing pleasantness ratings of affective touch at three velocities for varying levels of depressive symptoms.

Appendix 2.12 Full study questionnaire

The association between depressive symptoms and perceptions and attitudes to social touch

## Appendix 2.1: Ethical approval from the University of Liverpool Research Review Committee



Institute of Population Health Research Ethics Committee

24 May 2021

Dear Dr Krahe

I am pleased to inform you that your application for research ethics approval has been approved. Application details and conditions of approval can be found below. Appendix A contains a list of documents approved by the Committee.

### Application Details

Reference: 8518  
Project Title: Low mood and perceptions of social touch  
Principal Investigator/Supervisor: Dr Charlotte Krahe  
Co-Investigator(s): Miss Victoria Tinker  
Lead Student Investigator: -  
Department: Psychological Sciences  
Approval Date: 24/05/2021  
Approval Expiry Date: Five years from the approval date listed above

The application was **APPROVED** subject to the following conditions:

### Conditions of approval

**Please note:** this approval is subject to the University's research restrictions during the pandemic, as laid out on the [research ethics webpages](#). Therefore, wherever possible, research should be conducted via remote means which avoid the need for face-to-face contact with human participants during the pandemic. The process for requesting an exemption to these restrictions is described on the [research ethics webpages](#).

- All serious adverse events must be reported to the Committee ([ethics@liverpool.ac.uk](mailto:ethics@liverpool.ac.uk)) in accordance with the procedure for reporting adverse events.
- If you wish to extend the duration of the study beyond the research ethics approval expiry date listed above, a new application should be submitted.
- If you wish to make an amendment to the study, please create and submit an amendment form using the research ethics system.
- If the named Principal Investigator or Supervisor changes, or leaves the employment of the University during the course of this approval, the approval will lapse. Therefore it will be necessary to create and submit an amendment form within the research ethics system.
- It is the responsibility of the Principal Investigator/Supervisor to inform all the investigators of the terms of the approval.

Kind regards,

Institute of Population Health Research Ethics Committee

[iphethics@liverpool.ac.uk](mailto:iphethics@liverpool.ac.uk)

IPH-REC



## The association between depressive symptoms and perceptions and attitudes to social touch

### **Appendix - Approved Documents**

(Relevant only to amendments involving changes to the study documentation)

The final document set reviewed and approved by the committee is listed below:

<b>Document Type</b>	<b>File Name</b>	<b>Date</b>	<b>Version</b>
Study Proposal/Protocol	Research Proposal v2	27/01/2021	2
Evidence Of Peer Review	Victoria Tinker Proposal Amendment Approval letter 23.02.2021[1].pdf	23/02/2021	1
Questionnaire	Questionnaire v2	26/03/2021	2
Participant Consent Form	Participant Consent Form v3	12/04/2021	3
Debriefing Material	Debrief Form v3	12/04/2021	3
Advertisement	Advert v4	14/05/2021	4
Participant Information Sheet	Participant information sheet v4	14/05/2021	4

## Appendix 2.1: Study advert



### Research Study

## Exploring the relationship between low mood and attitudes to social touch

We are exploring the association between low mood and perceptions and attitudes to social touch.

We are inviting individuals to complete a set of questionnaires and view videos of social touch online.

### What is involved?

This study will involve completing an online questionnaire about your current mood, questionnaires about how you perceive and feel about touch (e.g., hugs) and watching a series of videos demonstrating social touch.

You can take part if:

- ◇ You are aged 18 or over
- ◇ You speak English
- ◇ You have internet access
- ◇ You don't experience allodynia (sensitivity to touch that can result in experiencing pain)
- ◇ You don't have any visual impairments



The questionnaire will take you around 20 minutes to complete. All responses will be completely anonymous and will not be able to be traced back to you. You will be reimbursed for your time on completion of the study.

For more information, or to take part

Please visit: (link to study to be confirmed)

Scan QR code: QR code to be confirmed

Email: [Victoria.tinker@liverpool.ac.uk](mailto:Victoria.tinker@liverpool.ac.uk)

## Appendix 2.3: Participant information sheet

Version 3  
Date: 12/04/2021



### Participant Information Sheet

#### **The association between low mood and perceptions and attitudes to social touch: an online study.**

You are being invited to participate in a research project. This project is being supervised by Dr Charlotte Krahe and Dr Paula Trotter and conducted by Victoria Tinker (doctoral student).

Before you decide to take part, it is important that you understand the purpose of the research and what it will involve. Please take your time to read the following information carefully and discuss it with others if you wish. Feel free to ask any questions if anything is not clear or you would like more information. We would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.

Thank you for taking the time to read this.

#### **What is the aim of the research?**

The aim of the research is to explore the association between low mood and your experience, perception and attitudes to social touch e.g., holding hands, hugging and arm stroking.

#### **Why have I been invited to take part?**

We would like to invite members of the general public who:

- Are aged 18 or over
- Are fluent in English
- Have access to the internet
- Do not experience allodynia (feel pain in response to touch)
- Do not have visual impairments

*If you meet these criteria, then you are eligible to take part in this research.*

#### **Do I have to take part?**

You are under no obligation to take part in this research; this is completely your choice. If you do decide to take part, you will be able to keep a copy of this information sheet and you will be asked to indicate your agreement to the online consent form. Also, you are free to withdraw at any time during the study without providing any reason or explanation.

#### **What will happen if I take part?**

If you consent to take part in the study, you will be asked to complete an online questionnaire and view videos of social touch. This should take approximately 20 minutes. Firstly, you will be asked to provide a few general details about yourself (e.g., gender, age etc.). You will then be asked questions regarding your current mood (e.g., sadness, loss of pleasure, loss of energy). You will then be shown videos of social touch and asked to rate how pleasant you think it would be to be touched like that. You will then be asked to answer questions relating to how you experience day to day activities, and also how you experience and perceive touch from others.

Version 3  
Date: 12/04/2021



Upon the completion of the questionnaires, you will receive a debrief form explaining the purpose of the study. You will also receive a £5 voucher for your time.

**What are the possible disadvantages/risks of taking part?**

There are no direct risks or disadvantages expected as a result of participation. Some individuals may find questions regarding their mental wellbeing and experience of touch upsetting. Resources which might be useful, such as support numbers and website links, will be provided at the end of the survey. You are also free to stop at any point if you wish to do so, simply by closing your browser tab.

**What are the possible benefits of taking part?**

There is currently no research into how low mood shapes the perception of social touch. This study provides the opportunity to contribute to this research, the findings of which will be shared and disseminated. We hope this will inform future interventions by helping us to understand factors related to seeking touch interventions.

**How will my data be used?**

The University processes personal data as part of its research and teaching activities in accordance with the lawful basis of ‘public task’, and in accordance with the University’s purpose of “advancing education, learning and research for the public benefit.

Under UK data protection legislation, the University acts as the Data Controller for personal data collected as part of the University’s research. The [Principal Investigator / Supervisor] acts as the Data Processor for this study, and any queries relating to the handling of your personal data can be sent to Dr Charlotte Krahe or Victoria Tinker (please see the contact details below).

Further information on how your data will be used can be found in the table below:

How will my data be collected?	Via Qualtrics (website)
How will my data be stored?	On a password protected computer.
How long will my data be stored for?	10 years, as per the University of Liverpool’s policy.
What measures are in place to protect the security and confidentiality of my data?	An electronic copy of research data will be stored confidentially on a password protected computer in accordance with University of Liverpool Data Management Policy.
Will my data be anonymised?	Yes
How will my data be used?	For inclusion in research - doctoral thesis, viva and possible further dissemination in peer reviewed journals.
Who will have access to my data?	The named research team- Victoria Tinker, Dr Charlotte Krahe and Dr Paula Trotter.
Will my data be archived for use in other research projects in the future?	The primary Investigator controls access to the data in order for it to be re-used in the future.

Version 3  
Date: 12/04/2021



How will my data be destroyed?	Following the 10 year data storage period, all data will be deleted from the password protected computer.
--------------------------------	---

**Will my participation be kept confidential, and what will happen to the results?**

All the information collected during the course of the research will be anonymous. All information will be stored in line with the University of Liverpool's guidelines. All participants will be anonymised, thus none of the research team will know who has filled in the questionnaire when it comes to looking at the data.

**What will happen if I want to stop taking part?**

You are under no obligation to take part in this research. If you do decide to take part, you are free to withdraw at any moment, without giving any reason or explanation.

However, any data you have provided up to that point will not be able to be withdrawn, as it is collected anonymously and we are not able to trace it back to you.

**What if I am unhappy, or there is a problem?**

If you are unhappy, or if there is a problem, please feel free to let us know by contacting Dr Charlotte Krahe ([charlotte.krahe@liverpool.ac.uk](mailto:charlotte.krahe@liverpool.ac.uk)) or Victoria Tinker ([Victoria.tinker@liverpool.ac.uk](mailto:Victoria.tinker@liverpool.ac.uk)).

If you have a complaint which you feel you cannot come to us with then you should contact the Research Ethics and Integrity Officer on 0151 794 8290 ([ethics@liv.ac.uk](mailto:ethics@liv.ac.uk)). When contacting the Research Ethics and Integrity Officer, please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

The University strives to maintain the highest standards of rigour in the processing of your data. However, if you have any concerns about the way in which the University processes your personal data, it is important that you are aware of your right to lodge a complaint with the Information Commissioner's Office by calling 0303 123 1113.

**Will my taking part be covered by an insurance scheme?**

Participants taking part in any research has been approved by the University of Liverpool are covered by the University's insurance scheme.

**Who can I contact if I have any further questions?**

Principal investigator: Victoria Tinker [Victoria.tinker@liverpool.ac.uk](mailto:Victoria.tinker@liverpool.ac.uk)

Supervisory investigators: Dr Charlotte Krahe [Charlotte.krahe@liverpool.ac.uk](mailto:Charlotte.krahe@liverpool.ac.uk)  
Dr Paula Trotter [P.D.Trotter@ljmu.ac.uk](mailto:P.D.Trotter@ljmu.ac.uk)

*Thank you for taking your time to read this information sheet.*

## Appendix 2.4: Consent form



Version 3  
Date: 12/04/2021

### Participant Consent Form

**Research ethics approval number:** 8518

**Title of the research project:** The association between low mood and perceptions and attitudes to social touch: an online study.

**Name of researcher(s):** Victoria Tinker (chief investigator), Dr Charlotte Krahe (Primary Supervisor) and Dr Paula Trotter (Secondary Supervisor)

Please initial

1. I confirm that I have read and have understood the information sheet dated [DATE] for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that taking part in the study involves answering online questionnaires and watching videos of social touch.
3. I understand that my participation is voluntary and that I am free to stop taking part and can withdraw from the study at any time without giving any reason. As data is captured anonymously, I understand that any data I have provided up to the point of withdrawing from the study cannot be deleted, as there is no way of tracing it back to me.
4. I understand that the information I provide will be held securely and in line with data protection requirements at the University of Liverpool until it is fully anonymised and then deposited in the archive for sharing and use by other authorised researchers to support other research in the future.
5. I understand that signed consent forms and questionnaires will be retained in an encrypted file on the University of Liverpool's network for a period of 10 years.
6. I agree to take part in the above study.

#### Principal Investigator

Victoria Tinker  
University of Liverpool  
Ground Floor Whelan Building  
Brownlow Hill  
Liverpool  
L69 3GB  
[Victoria.Tinker@liverpool.ac.uk](mailto:Victoria.Tinker@liverpool.ac.uk)

#### Supervisory Investigators

Dr Charlotte Krahe  
University of Liverpool  
Ground Floor Whelan Building  
Brownlow Hill  
Liverpool  
L69 3GB  
[charlotte.krahe@liverpool.ac.uk](mailto:charlotte.krahe@liverpool.ac.uk)

Dr Paula Trotter  
Liverpool John Moores University  
James Parsons Building  
Byrom Street  
Liverpool  
L3 3AF  
[P.D.Trotter@ljmu.ac.uk](mailto:P.D.Trotter@ljmu.ac.uk)

## Appendix 2.5: Demographic Questions

### Demographics

- How old are you?
- What is your gender?
  - Female
  - Male
  - Non-binary
  - Third gender
  - Prefer not to say
  - Prefer to self-describe, please state
- What is your sex?
  - Female
  - Male
  - Non-binary
  - Gender-fluid
  - Agender
  - Unspecified
  - Intersex
  - Prefer not to say
  - Prefer to self-describe, please state
- What is your ethnic group?
  - White
  - Black – African/Caribbean
  - Asian – Indian/Pakistani/Bangladeshi
  - Asian – Oriental
  - Arab
  - Mixed/multiple ethnic groups
  - Other, please specify
- Do you consider yourself to have a disability?
- What is your marital status?
  - Single
  - In a relationship
  - Cohabiting
  - Married
  - Separated
  - Divorced
  - Widowed
- How many people do you live with?
- What is your relationship to them?
- Have you ever received a diagnosis of depression?
- Have you ever received any additional and/or primary psychiatric diagnoses?  
e.g., anxiety disorder
- Are you currently taking any medication?
  - If yes, please give the name(s) of the medication(s)

The association between depressive symptoms and perceptions and attitudes to social touch

## Appendix 2.6: Beck Depression Inventory (BDI-II; Beck, Steer & Brown, 1996)

### 1. Sadness

0. I do not feel sad.
1. I feel sad much of the time.
2. I am sad all the time.
3. I am so sad or unhappy that I can't stand it.

### 2. Pessimism

0. I am not discouraged about my future.
1. I feel more discouraged about my future than I used to.
2. I do not expect things to work out for me.
3. I feel my future is hopeless and will only get worse.

### 3. Past Failure

0. I do not feel like a failure.
1. I have failed more than I should have.
2. As I look back, I see a lot of failures.
3. I feel I am a total failure as a person.

### 8. Self-Criticalness

0. I don't criticize or blame myself more than usual.
1. I am more critical of myself than I used to be.
2. I criticize myself for all of my faults.
3. I blame myself for everything bad that happens.

### 9. Suicidal Thoughts or Wishes

0. I don't have any thoughts of killing myself.
1. I have thoughts of killing myself, but I would not carry them out.
2. I would like to kill myself.
3. I would kill myself if I had the chance.

### 10. Crying

0. I don't cry anymore than I used to.
1. I cry more than I used to.
2. I cry over every little thing.
3. I feel like crying, but I can't.

### 11. Agitation

0. I am no more restless or wound up than usual.
1. I feel more restless or wound up than usual.
2. I am so restless or agitated, it's hard to stay still.
3. I am so restless or agitated that I have to keep moving or doing something.



## The association between depressive symptoms and perceptions and attitudes to social touch

### 4. Loss of Pleasure

- 0. I get as much pleasure as I ever did from the things I enjoy.
- 1. I don't enjoy things as much as I used to.
- 2. I get very little pleasure from the things I used to enjoy.
- 3. I can't get any pleasure from the things I used to enjoy.

### 5. Guilty Feelings

- 0. I don't feel particularly guilty.
- 1. I feel guilty over many things I have done or should have done.
- 2. I feel quite guilty most of the time.
- 3. I feel guilty all of the time.

### 6. Punishment Feelings

- 0. I don't feel I am being punished.
- 1. I feel I may be punished.
- 2. I expect to be punished.
- 3. I feel I am being punished.

### 7. Self-Dislike

- 0. I feel the same about myself as ever.
- 1. I have lost confidence in myself.
- 2. I am disappointed in myself.
- 3. I dislike myself.

### 12. Loss of Interest

- 0. I have not lost interest in other people or activities.
- 1. I am less interested in other people or things than before.
- 2. I have lost most of my interest in other people or things.
- 3. It's hard to get interested in anything.

### 13. Indecisiveness

- 0. I make decisions about as well as ever.
- 1. I find it more difficult to make decisions than usual.
- 2. I have much greater difficulty in making decisions than I used to.
- 3. I have trouble making any decisions.

### 14. Worthlessness

- 0. I do not feel I am worthless.
- 1. I don't consider myself as worthwhile and useful as I used to.
- 2. I feel more worthless as compared to others.
- 3. I feel utterly worthless.

### 15. Loss of Energy

- 0. I have as much energy as ever.
- 1. I have less energy than I used to have.
- 2. I don't have enough energy to do very much.
- 3. I don't have enough energy to do anything.

The association between depressive symptoms and perceptions and attitudes to social touch

## Appendix 2.7: Social Touch videos (Walker et al., 2017) and pleasantness rating question

### Video Task

Participants will view a total of 6 videos (as used in Walker et al., 2017) depicting social touch on 2 locations (the forearm and palm of the hand), each at 3 different velocities (0.3, 3 and 30cm/s).



Location: Forearm  
Velocity: 0.5 cm/s



Location: Forearm  
Velocity: 3 cm/s



Location: Forearm  
Velocity: 30 cm/s



Location: Palm of hand  
Velocity: 0.5 cm/s



Location: Palm of hand  
Velocity: 3 cm/s



Location: Palm of hand  
Velocity: 30 cm/s

After each video, participants will be asked to answer the question “How pleasant would it be to be touched like this?” with participants rating responses using a visual analogue scale from very unpleasant to very pleasant.

“How pleasant would it be to be touched like this?”

1 - very unpleasant	2	3	4	5	6	7 - very pleasant
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Appendix 2.8: Snaith–Hamilton Pleasure Scale (SHAPS; Snaith, 1995)

1. I would enjoy my favourite television or radio programme:

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly agree [ ]

2. I would enjoy being with my family or close friends:

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

3. I would find pleasure in my hobbies and pastimes:

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly agree [ ]

4. I would be able to enjoy my favourite meal:

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

5. I would enjoy a warm bath or refreshing shower:

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

6. I would find pleasure in the scent of flowers or the smell of a fresh sea breeze or freshly baked bread:

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly agree [ ]

7. I would enjoy seeing other people's smiling faces:

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

**8. I would enjoy looking smart when I have made an effort with my appearance:**

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly agree [ ]

**9. I would enjoy reading a book, magazine or newspaper:**

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

**10. I would enjoy a cup of tea or coffee or my favourite drink:**

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly agree [ ]

**11. I would find pleasure in small things, e.g. bright sunny day, a telephone call from a friend:**

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly disagree [ ]

**12. I would be able to enjoy a beautiful landscape or view:**

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

**13. I would get pleasure from helping others:**

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly agree [ ]

**14. I would feel pleasure when I receive praise from other people:**

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

The association between depressive symptoms and perceptions and attitudes to social touch

**Appendix 2.9: Touch Experiences and Attitudes Questionnaire (TEAQ; Trotter, McGlone, Reniers, & Deakin, 2018)**

Please select a response next to each of the statements below to indicate how much you agree or disagree with each statement

	<b>Disagree strongly</b>	<b>Disagree a little</b>	<b>Neither agree nor disagree</b>	<b>Agree a little</b>	<b>Agree strongly</b>
1. I dislike people being very physically affectionate towards me					
2. I like using body lotions					
3. I have to know someone quite well to enjoy a hug from them					
4. I find it natural to greet my friends and family with a kiss on the cheek					
5. There was a lot of physical affection during my childhood					
6. As a child I would often hug family members					
7. I like to use bath essence when having a bath					
8. I find stroking the hair of a person I am fond of very pleasurable					
9. My parents were not very physically affectionate towards me during my childhood					
10. I like to fall asleep in the arms of someone I am close to					
11. I often snuggle up on the sofa with someone					
12. I enjoy the physical intimacy of sexual foreplay					

The association between depressive symptoms and perceptions and attitudes to social touch

	<b>Disagree strongly</b>	<b>Disagree a little</b>	<b>Neither agree nor disagree</b>	<b>Agree a little</b>	<b>Agree strongly</b>
13. I like to link arms with my friends and family as I walk along					
14. I usually hug my family and friends when I am saying goodbye					
15. As a child I found a hug from my parents when I was upset made me feel much happier					
16. It's nice when friends and family members greet me with a kiss					
17. I often hold hands with someone I know intimately					
18. When I am upset, there is usually someone who can comfort me.					
19. Kissing is a great way of expressing physical attraction					
20. It feels really good when someone I am fond of runs their fingers through my hair					
21. I regularly hug people I am close to					
22. As a child my parents would tuck me up in bed every night and give me a hug and a kiss goodnight					
23. My life lacks physical affection					
24. I enjoy having my skin stroked					
25. I often take a shower or bath with someone					
26. I enjoy having sex					
27. I often have sex					

The association between depressive symptoms and perceptions and attitudes to social touch

	<b>Disagree strongly</b>	<b>Disagree a little</b>	<b>Neither agree nor disagree</b>	<b>Agree a little</b>	<b>Agree strongly</b>
28. I am put off by physical familiarity					
29. I can always find somebody to physically comfort me when I am upset					
30. I always greet my friends and family by giving them a hug					
31. I enjoy being cuddled by someone I am fond of					
32. My mother regularly bathed me as a child					
33. As a child my parents always comforted me when I was upset					
34. I enjoy the feeling of my skin against someone else's if I know them intimately					
35. As a child my parents would often hold my hand when I was walking along with them					
36. Most days I get a hug or a kiss					
37. If someone I don't know very well puts a friendly hand on my arm it makes me feel uncomfortable					
38. I often make physical contact with my friends and family when I am with them					
39. It makes me feel uncomfortable if someone I don't know very well touches me in a friendly manner					
40. I enjoy holding hands with someone I am fond of					

The association between depressive symptoms and perceptions and attitudes to social touch

	<b>Disagree strongly</b>	<b>Disagree a little</b>	<b>Neither agree nor disagree</b>	<b>Agree a little</b>	<b>Agree strongly</b>
41. I often share a romantic kiss					
42. As a child my mother regularly brushed my hair					
43. I like exfoliating my skin					
44. Kissing is an enjoyable part of expressing romantic feeling					
45. I often have my skin stroked					
46. I often hold hands with someone I am fond of					
47. I like to stroke the skin of someone I know intimately					
48. I am on huggable terms with quite a few people					
49. I often fall asleep while holding someone I am close to					
50. Snuggling up on the sofa with someone is great					
51. I often put my arm around a close friend as we walk along together					
52. I like having a bath with lots of bubble bath					
53. I don't get many hugs these days					
54. I am often given a shoulder massage					
55. I like to use face masks on my skin					
56. I like it when my friends and family greet me by giving me a hug					









The association between depressive symptoms and perceptions and attitudes to social touch







	<b>Disagree strongly</b>	<b>Disagree a little</b>	<b>Neither agree nor disagree</b>	<b>Agree a little</b>	<b>Agree strongly</b>
57. I often link arms with my friends and family as I walk along					

**Appendix 2.10: Longing for touch measure: Interpersonal Touch Picture Questionnaire (LITPQ; Bessler, Bendas, Sailer & Croy, 2020)**

**How often did you experience this type of touch in the last week?**

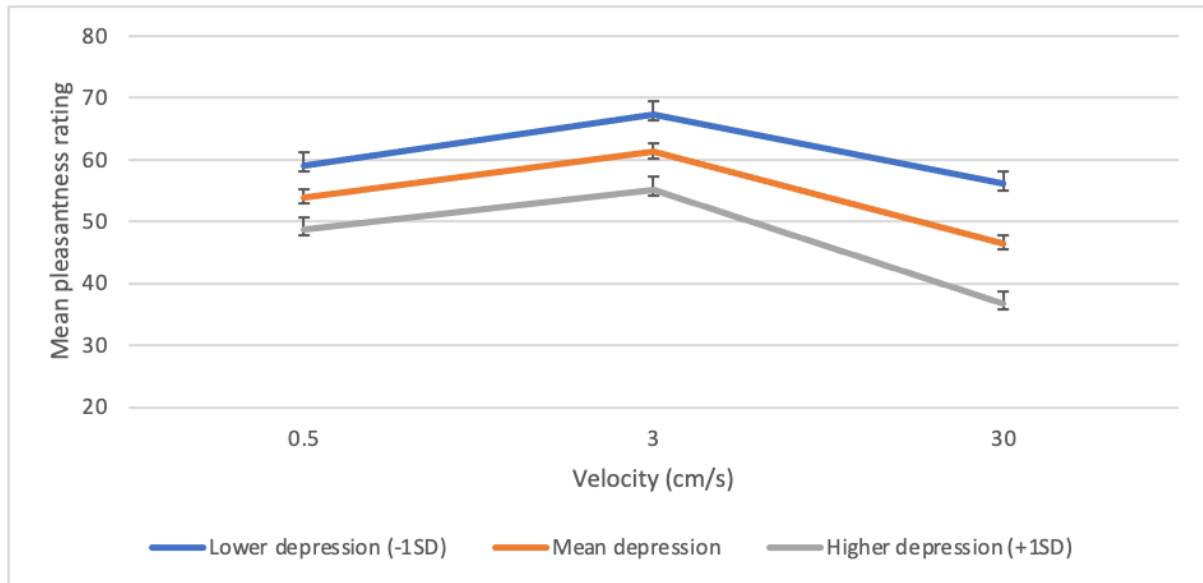
	... to a romantic partner?	... to a female friend?	... to a male friend?	...to a female acquaintance?	... to a male acquaintance ?	... to a female stanger?	... to a male stranger?
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

**How often would you have wanted to experience this type of touch in the last week?**

	... to a romantic partner?	... to a female friend?	... to a male friend?	...to a female acquaintance?	... to a male acquaintance ?	... to a female stanger?	... to a male stranger?
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

The association between depressive symptoms and perceptions and attitudes to social touch

**Appendix 2.11: Graph showing pleasantness ratings of affective touch at three velocities for varying levels of depressive symptoms.**



## Appendix 2.12: Template of full study questionnaire

### Information sheet

#### Consent form

#### Demographics

- How old are you?
- What is your gender?
  - Female
  - Male
  - Non-binary
  - Third gender
  - Prefer not to say
  - Prefer to self-describe, please state
- What is your sex?
  - Female
  - Male
  - Non-binary
  - Gender-fluid
  - Agender
  - Unspecified
  - Intersex
  - Prefer not to say
  - Prefer to self-describe, please state
- What is your ethnic group?
  - White
  - Black – African/Caribbean
  - Asian – Indian/Pakistani/Bangladeshi
  - Asian – Oriental
  - Arab
  - Mixed/multiple ethnic groups
  - Other, please specify
- Do you consider yourself to have a disability?
- What is your marital status?
  - Single
  - In a relationship
  - Cohabiting
  - Married
  - Separated
  - Divorced
  - Widowed
- How many people do you live with?
- What is your relationship to them?
- Have you ever received a diagnosis of depression?
- Have you ever received any additional and/or primary psychiatric diagnoses? e.g. anxiety disorder
- Are you currently taking any medication?
  - If yes, please give the name(s) of the medication(s)

## The association between depressive symptoms and perceptions and attitudes to social touch

### BDI-II

1. Sadness
  0. I do not feel sad.
  1. I feel sad much of the time.
  2. I am sad all the time.
  3. I am so sad or unhappy that I can't stand it.
2. Pessimism
  0. I am not discouraged about my future.
  1. I feel more discouraged about my future than I used to.
  2. I do not expect things to work out for me.
  3. I feel my future is hopeless and will only get worse.
3. Past Failure
  0. I do not feel like a failure.
  1. I have failed more than I should have.
  2. As I look back, I see a lot of failures.
  3. I feel I am a total failure as a person.
4. Loss of Pleasure
  0. I get as much pleasure as I ever did from the things I enjoy.
  1. I don't enjoy things as much as I used to.
  2. I get very little pleasure from the things I used to enjoy.
  3. I can't get any pleasure from the things I used to enjoy.
5. Guilty Feelings
  0. I don't feel particularly guilty.
  1. I feel guilty over many things I have done or should have done.
  2. I feel quite guilty most of the time.
  3. I feel guilty all of the time.
6. Punishment Feelings
  0. I don't feel I am being punished.
  1. I feel I may be punished.
  2. I expect to be punished.
  3. I feel I am being punished.
7. Self-Dislike
  0. I feel the same about myself as ever.
  1. I have lost confidence in myself.
  2. I am disappointed in myself.
  3. I dislike myself.
8. Self-Criticalness
  0. I don't criticize or blame myself more than usual.
  1. I am more critical of myself than I used to be.
  2. I criticize myself for all of my faults.
  3. I blame myself for everything bad that happens.
9. Suicidal Thoughts or Wishes
  0. I don't have any thoughts of killing myself.
  1. I have thoughts of killing myself, but I would not carry them out.
  2. I would like to kill myself.
  3. I would kill myself if I had the chance.
10. Crying
  0. I don't cry anymore than I used to.
  1. I cry more than I used to.
  2. I cry over every little thing.
  3. I feel like crying, but I can't.
11. Agitation
  0. I am no more restless or wound up than usual.
  1. I feel more restless or wound up than usual.
  2. I am so restless or agitated, it's hard to stay still.
  3. I am so restless or agitated that I have to keep moving or doing something.
12. Loss of Interest
  0. I have not lost interest in other people or activities.
  1. I am less interested in other people or things than before.
  2. I have lost most of my interest in other people or things.
  3. It's hard to get interested in anything.
13. Indecisiveness
  0. I make decisions about as well as ever.
  1. I find it more difficult to make decisions than usual.
  2. I have much greater difficulty in making decisions than I used to.
  3. I have trouble making any decisions.
14. Worthlessness
  0. I do not feel I am worthless.
  1. I don't consider myself as worthwhile and useful as I used to.
  2. I feel more worthless as compared to others.
  3. I feel utterly worthless.
15. Loss of Energy
  0. I have as much energy as ever.
  1. I have less energy than I used to have.
  2. I don't have enough energy to do very much.
  3. I don't have enough energy to do anything.

If a person responds to the BDI-II item about suicidal thoughts, then Qualtrics will automatically display these resources on that page before participants proceed to the next questionnaires.

The association between depressive symptoms and perceptions and attitudes to social touch

### Video Tasks – 3 locations, 3 velocities

Individuals will then view 6 videos (as used in Walker et al., 2017) depicting social touch on 2 locations (the forearm and palm of the hand), each at 3 different velocities (one in the optimal affective touch range: 3cm/s and two in a comparison neutral range: 0.3 and 30 cm/s). The order of velocities and locations will be counterbalanced across participants.



Location: Forearm  
Velocity: 0.5 cm/s



Location: Forearm  
Velocity: 3 cm/s



Location: Forearm  
Velocity: 30 cm/s



Location: Palm of hand  
Velocity: 0.5 cm/s



Location: Palm of hand  
Velocity: 3 cm/s



Location: Palm of hand  
Velocity: 30 cm/s

How pleasant do you think it would be to be touched like that?

1 - very unpleasant	2	3	4	5	6	7 - very pleasant
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The association between depressive symptoms and perceptions and attitudes to social touch

**Snaith–Hamilton Pleasure Scale (SHAPS; Snaith, 1995)**

1. I would enjoy my favourite television or radio programme:

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly agree [ ]

2. I would enjoy being with my family or close friends:

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

3. I would find pleasure in my hobbies and pastimes:

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly agree [ ]

4. I would be able to enjoy my favourite meal:

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

5. I would enjoy a warm bath or refreshing shower:

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

6. I would find pleasure in the scent of flowers or the smell of a fresh sea breeze or freshly baked bread:

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly agree [ ]

7. I would enjoy seeing other people's smiling faces:

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

**8. I would enjoy looking smart when I have made an effort with my appearance:**

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly agree [ ]

**9. I would enjoy reading a book, magazine or newspaper:**

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

**10. I would enjoy a cup of tea or coffee or my favourite drink:**

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly agree [ ]

**11. I would find pleasure in small things, e.g. bright sunny day, a telephone call from a friend:**

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly disagree [ ]

**12. I would be able to enjoy a beautiful landscape or view:**

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]

**13. I would get pleasure from helping others:**

- Strongly disagree [ ]
- Disagree [ ]
- Agree [ ]
- Strongly agree [ ]

**14. I would feel pleasure when I receive praise from other people:**

- Definitely agree [ ]
- Agree [ ]
- Disagree [ ]
- Strongly disagree [ ]



The association between depressive symptoms and perceptions and attitudes to social touch

### Touch Experiences and Attitudes Questionnaire (TEAQ)

Please select a response next to each of the statements below to indicate how much you agree or disagree with each statement

	<b>Disagree strongly</b>	<b>Disagree a little</b>	<b>Neither agree nor disagree</b>	<b>Agree a little</b>	<b>Agree strongly</b>
1. I dislike people being very physically affectionate towards me					
2. I like using body lotions					
3. I have to know someone quite well to enjoy a hug from them					
4. I find it natural to greet my friends and family with a kiss on the cheek					
5. There was a lot of physical affection during my childhood					
6. As a child I would often hug family members					
7. I like to use bath essence when having a bath					
8. I find stroking the hair of a person I am fond of very pleasurable					
9. My parents were not very physically affectionate towards me during my childhood					
10. I like to fall asleep in the arms of someone I am close to					
11. I often snuggle up on the sofa with someone					
12. I enjoy the physical intimacy of sexual foreplay					

The association between depressive symptoms and perceptions and attitudes to social touch

	<b>Disagree strongly</b>	<b>Disagree a little</b>	<b>Neither agree nor disagree</b>	<b>Agree a little</b>	<b>Agree strongly</b>
13. I like to link arms with my friends and family as I walk along					
14. I usually hug my family and friends when I am saying goodbye					
15. As a child I found a hug from my parents when I was upset made me feel much happier					
16. It's nice when friends and family members greet me with a kiss					
17. I often hold hands with someone I know intimately					
18. When I am upset, there is usually someone who can comfort me.					
19. Kissing is a great way of expressing physical attraction					
20. It feels really good when someone I am fond of runs their fingers through my hair					
21. I regularly hug people I am close to					
22. As a child my parents would tuck me up in bed every night and give me a hug and a kiss goodnight					
23. My life lacks physical affection					
24. I enjoy having my skin stroked					

The association between depressive symptoms and perceptions and attitudes to social touch

	<b>Disagree strongly</b>	<b>Disagree a little</b>	<b>Neither agree nor disagree</b>	<b>Agree a little</b>	<b>Agree strongly</b>
25. I often take a shower or bath with someone					
26. I enjoy having sex					
27. I often have sex					
28. I am put off by physical familiarity					
29. I can always find somebody to physically comfort me when I am upset					
30. I always greet my friends and family by giving them a hug					
31. I enjoy being cuddled by someone I am fond of					
32. My mother regularly bathed me as a child					
33. As a child my parents always comforted me when I was upset					
34. I enjoy the feeling of my skin against someone else's if I know them intimately					
35. As a child my parents would often hold my hand when I was walking along with them					
36. Most days I get a hug or a kiss					
37. If someone I don't know very well puts a friendly hand on my arm it makes me feel uncomfortable					

The association between depressive symptoms and perceptions and attitudes to social touch







	<b>Disagree strongly</b>	<b>Disagree a little</b>	<b>Neither agree nor disagree</b>	<b>Agree a little</b>	<b>Agree strongly</b>
38. I often make physical contact with my friends and family when I am with them					
39. It makes me feel uncomfortable if someone I don't know very well touches me in a friendly manner					
40. I enjoy holding hands with someone I am fond of					
41. I often share a romantic kiss					
42. As a child my mother regularly brushed my hair					
43. I like exfoliating my skin					
44. Kissing is an enjoyable part of expressing romantic feeling					
45. I often have my skin stroked					
46. I often hold hands with someone I am fond of					
47. I like to stroke the skin of someone I know intimately					
48. I am on huggable terms with quite a few people					
49. I often fall asleep while holding someone I am close to					
50. Snuggling up on the sofa with someone is great					

The association between depressive symptoms and perceptions and attitudes to social touch







	<b>Disagree strongly</b>	<b>Disagree a little</b>	<b>Neither agree nor disagree</b>	<b>Agree a little</b>	<b>Agree strongly</b>
51. I often put my arm around a close friend as we walk along together					
52. I like having a bath with lots of bubble bath					
53. I don't get many hugs these days					
54. I am often given a shoulder massage					
55. I like to use face masks on my skin					
56. I like it when my friends and family greet me by giving me a hug					
57. I often link arms with my friends and family as I walk along					

### Longing for touch measure: Interpersonal Touch Picture Questionnaire

**How often did you experience this type of touch in the last week?**

	... to a romantic partner?	... to a female friend?	... to a male friend?	...to a female acquaintance?	... to a male acquaintance ?	... to a female stanger?	... to a male stranger?
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

**How often would you have wanted to experience this type of touch in the last week?**

	... to a romantic partner?	... to a female friend?	... to a male friend?	...to a female acquaintance?	... to a male acquaintance ?	... to a female stanger?	... to a male stranger?
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

THANK YOU FOR TAKING PART IN THIS STUDY  
YOUR RESPOJSE HAS BEEN RECORDED  
PLEASE CLICK ON THE LINK TO RECEIVE YOUR £5 VOUCHER