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Investigating leftward cradling bias and predictors thereof in typically developing adult males

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Abstract

The tendency to cradle on the left side of the body while trying to soothe or put an infant to sleep is a well-established phenomenon. This leftward cradling bias is observed in 65–80% of human females across different cultures, historical periods and among female members of other mammalian species, signifying an evolutionary adaptive origin for the behaviour. However, no definitive findings exist around male cradling bias. Some suggest that a leftward bias is present, albeit less pronounced in males and appears to strengthen as males acquire caregiving experience. Recent explanations propose that leftward cradling reflects right-hemispheric specialisation for processing facial emotions while others argue further that it reflects right-hemispheric specialisation for bottom-up social-affective processes that underlie our capacity to relate to others. We aimed to investigate the prevalence of leftward cradling bias in males and its relation to several factors. Ninety right-handed males aged 18–56 were observed across four separate trials of an imaginary cradling scenario. Caregiving experience, attachment style, hemispheric lateralisation for processing facial emotion, and autistic traits were assessed. Male leftward cradling (77%) was statistically equivalent to that expected in female samples and was not contingent on caregiving experience. Regression analyses revealed that right-hemispheric lateralisation for processing facial emotions and autistic traits were both significant predictors of leftward cradling. Attachment style, however, did not significantly predict leftward cradling. Findings suggest no sex differences in leftward cradling bias and support hemispheric explanations that bottom-up processes involved in relating and communication—but not attachment—produce this lateralised behaviour.

Keywords: leftward cradling bias; attachment; autistic traits; social-affective processing; empathy; hemispheric asymmetry

The tendency to cradle on the left side of the body while trying to soothe or put an infant to sleep is a well-established human phenomenon (Jones, 2017; Salk, 1960). This leftward cradling bias is observed in approximately 65–80% of human females across different cultures and historical periods and female members of certain primate species (Harris, 2010; Karenina, Giljov, Ingram, Rowntree, & Malashichev, 2017). A number of different theories have been put forward to explain this behaviour. However, while research reveals a distinct leftward cradling bias in females, no definitive findings exist around male cradling bias. Some authors argue that this bias is less pronounced in males and increases in prevalence as males acquire caregiving experience (e.g., Bundy, 1979; Scola & Vauclair, 2010). Although findings point towards a biological underpinning for the leftward cradling bias, the majority of existing explanations for this lateralised behaviour have failed to clarify its adaptive purpose and adequately account for the sex differences in its display. The current study aimed to address the paucity of research conducted in male samples by investigating several factors that might influence male cradling bias, namely previous caregiving experience, attachment style, lateralisation for facial emotion processing, and traits related to the autism spectrum.

Cradling Bias and Handedness

Early investigators proposed that hand dominance is a key determinant in cradling bias (Huheey, 1977). This handedness hypothesis suggests that since the majority of individuals are right-hand dominant, most individuals should cradle infants on their left side in order to keep their dominant hand free to perform other tasks. However, while the handedness hypothesis may contribute to a bias when it comes to *functional* cradling, i.e., "cradling-while-doing-something-else" (Van der Meer & Husby, 2006, p. 263), it does not consistently predict non-functional cradling, namely cradling with the intention to soothe or put to sleep (Todd & Banerjee, 2016). Contrary to intuition, left-handed individuals not only fail to exhibit a rightward cradling bias in these particular instances but actually show a leftward cradling bias at the same rate as right-handers (Donnot, 2007; Scola & Vauclair, 2010).[1] Moreover, the proportion of individuals who exhibit leftward cradling (75%) does not match the proportion of those who exhibit right-hand dominance (90%; Annett, 2004). Thus, while

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[1] The implication here is that cradling bias varies as a function of the specific scenario in which cradling occurs. There is evidently some unique aspect of non-functional cradling that requires the infant's head to be positioned towards the left of an individual's midline and such determinants appear to override the potential influence of hand dominance.

handedness may offer a partial explanation for functional cradling bias, it is unable to account for the cradling bias of interest to the current study.

Cradling Bias and Hemispheric Asymmetry for Emotional Processing

Several cerebral explanations for the leftward cradling bias have been put forward, the strongest of which is perhaps the hemispheric specialisation hypothesis. This explanation suggests that it is the role of the right hemisphere in social-affective processing, specifically the visual processing of facial emotions, that underpins the phenomenon of leftward cradling (Bourne & Todd, 2004; Manning & Chamberlain, 1991). Information from the left visual hemispace is transmitted directly to the contralateral right hemisphere and a large number of cognitive and neurological studies demonstrate a right-hemispheric advantage for processing affective facial stimuli in both humans and other mammals indicating a biologically-based right hemisphere specialisation for processing facial emotion (Salva, Regolin, Mascalzoni, & Vallortigara, 2012; Yovel, 2016),

Previous studies have demonstrated an association between leftward cradling bias and strength of right hemispheric lateralisation for emotion processing by using chimeric face tasks (e.g., Harris, Cárdenas, Spradlin, & Almerigi, 2010; Huggenberger, Suter, Reijnen, & Schachinger, 2009). Chimeric faces are constructed from two vertically split images of an individual's face where one half displays a particular emotion (e.g., happiness) and the other half a neutral expression. During these tasks, individuals are presented with two chimeric faces, one in which the emotive side is displayed in the viewer's left visual hemispace and other in which the positive emotion is displayed in the viewer's right visual hemispace. Individuals are required to select which of the two faces they think looks the "strongest" in a particular emotion. A bias towards selecting the face in which the emotion is displayed in the viewer's left visual hemispace is thought to indicate right hemispheric dominance for emotion processing (Bourne & Todd, 2004).

This left visual hemispace bias is thought to directly influence the side to which caregivers' position in non-functional cradling scenarios. Cradling an infant to the left of the body positions that infant within the cradler's left visual hemispace. Thus, the hemispheric specialisation hypothesis posits that since affective facial information from the left visual hemispace is transmitted directly towards and interpreted more efficiently by the right hemisphere, leftward cradling might serve as the most effective means of recognising and interpreting an infant's emotional cues (Manning & Chamberlain, 1991).

In addition to positioning the infant within the cradler's left visual hemispace, leftward cradling also enables the infant to receive greater left visual input of the caregiver's

face. Studies show how the left side of the face displays greater emotive expressivity and that neonates are neurobiologically predisposed to attend to facial rather than other stimuli (Hendriks, van Rijswijk, & Omtzigt, 2010; Johnson, 2007; Johnson, Senju, & Tomalski, 2015). These adaptive features, together with the seemingly innate tendency to cradle towards the left, are thought to facilitate optimal monitoring of emotional states between caregiver and infant, that is, reciprocal affective *communication* (Huggenberger et al., 2009; Vauclair & Donnot, 2005). Nonetheless, lateralisation of affective communication may not be sufficient to predict cradling bias. The leftward cradling likely reflects a wide array of right-hemispheric functions which in combination produce and strengthen this phenomenon (Schore, 2005).

Cradling Bias and Social-Affective Attachment Processes

Alternative lateralisation views have also emerged which argue that leftward cradling enables more than just optimal monitoring and communicating of emotions. Sieratzki and Woll (1996, 2002) suggest that right-hemispheric lateralisation for emotion processing not only underlies the ability to perceive and communicate emotions in caregiver-infant interactions but also enables the formation of an emotional bond between the infant and the caregiver, i.e., the development of an intimate caregiver-infant relationship. In an early study by Weiland and Sperber (1970), female participants were first asked to hold a pillow against their chests and thereafter to hold the pillow as they would an infant when soothing or putting it to sleep. No cradling bias was evident after the first instruction. However, participants demonstrated a clear leftward cradling bias after the second instruction, suggesting that leftward cradling bias occurs in response to the formation of a caregiver-infant relationship. Indirect support for this idea can be seen in early studies showing an association between poorer quality caregiver-infant interactions and rightward cradling. In these studies, individuals who cradled to the right reportedly appeared unresponsive and more emotionally disengaged during infant-caregiver interactions (e.g., display less physical contact with their infants) compared to individuals who cradled to the left. This behaviour was thought to reflect a decreased willingness or capacity to *relate* emotionally on the part of the caregiver (Weatherhill et al., 2004).

A recent study by Pileggi, Malcolm-Smith, and Solms (2015) offers stronger evidence in favour of this theory. These authors observed how the leftward cradling bias is largely absent in children diagnosed with Autism Spectrum Disorders (ASD), the core aspect of which is the impaired ability to relate and form emotional bonds with others (Decety & Lamm, 2006; Minio-Paluello, Baron-Cohen, Avenanti, Walsh, & Aglioti, 2009). Children

with ASD demonstrated no cradling side preference compared to typically developing and intellectually-disabled groups who each exhibited a strong leftward bias. An ASD diagnosis was the only significant predictor of atypical cradling bias. Furthermore, intellectual performance and executive function were not associated with cradling bias which, along with the display of a left cradling bias in the intellectually-disabled group, implies that cradling bias is not facilitated by higher-order cognitive processes. On the contrary, when one considers how the leftward cradling bias is often displayed without conscious awareness and appears in both terrestrial and marine mammals who evidently lack higher-order cognitive functioning, it is reasonable to suggest that the leftward cradling bias reflects more basic, bottom-up processes of relating to others (Pileggi et al., 2015).

Another study carried out by Fleva and Khan (2015) revealed that typically developing adults scoring high on measures of autistic traits (i.e., traits characterised by a reduction in social and emotional relating) exhibited a decreased leftward cradling bias compared to controls scoring within the normal range of these traits. In addition, reduced leftward cradling in those high in autistic traits was related to low scores on measures of empathic behaviour and ability to infer the emotional states in the eyes of other individuals. These findings lend further support to the idea that leftward cradling may reflect the rudimentary ability to relate to others which in turn facilitates empathic behaviour and the development of intimate, social-affective bonds between caregivers and infants.

There is preliminary evidence for advantageous lateralisation outcomes in relation to leftward cradling bias that may ultimately serve to promote empathy development. In a retrospective study conducted by Vervloed, Hendriks, and van den Eijnde (2011), adults' lateralisation for facial emotion processing was examined in relation to their mothers' cradling bias exhibited during their infancy. Outcomes of the study revealed how left-cradled individuals exhibited a typical right lateralisation bias for processing facial emotions whereas right-cradled individuals showed a significantly reduced right lateralisation bias. These findings suggest that even a slight decrease in exposure to affective facial information during infancy may be sufficient to inhibit developmental lateralisation trajectories, whereas adequate exposure during infancy may promote greater right-hemispheric lateralisation for processing facial emotions. Moreover, other studies on children show an association between right-hemispheric lateralisation for facial emotion processing and the ability to detect emotions in others' eyes (Workman, Chilvers, Yeomans, & Taylor, 2006). Overall, these findings suggest that leftward cradling may facilitate the link between hemispheric lateralisation for processing facial emotion and empathic development.

Male Cradling Bias and Previous Caregiving Experience

Despite recent development in theories around the potential underlying mechanisms of the leftward cradling bias, no definitive findings exist around male cradling bias. Specifically, it is unclear whether or not the same proportion of leftward cradling bias observed in females is evident in male samples.

One early study by De Château (1983) compared cradling biases between mothers, males who were long-time fathers, males who had recently become fathers, and males who were not fathers. All groups demonstrated a clear leftward cradling bias; however, this bias was significantly weaker among non-fathers. This finding suggested that male cradling bias may be influenced by their degree of parenting or caregiving experience (Turnbull & Lucas, 1991). Indeed, one could argue that frequency and length of contact with children may serve as a reinforcement mechanism for the display of leftward cradling in males as fathers are provided time to learn optimal monitoring and social-affective communication behaviours. However, recent studies in both fathers and young children have found no such relationship between cradling bias and caregiving experience (Forrester, Davis, Mareschal, Malatesta, & Todd, 2018; Scola & Vauclair, 2010).

Rationale, Specific Aims, and Hypotheses

Overall, there is a paucity of cradling bias research conducted in male samples. It remains unclear if males exhibit a leftward cradling bias, whether or not cradling bias differences exist between males and females, and what mechanisms might underlie any potential differences. Given the advantage leftward cradling bias is thought to have in females by creating optimal caregiver-infant emotional communication conditions, it is important to investigate whether such conditions may be typical in male caregiver-infant interactions. Any sex differences in caregiver-infant interactions may hold consequences for the type of bonds that can be established in between male caregivers and their infants. Furthermore, examining cradling bias in relation to autistic traits may offer us greater insights into more rudimentary bottom-up processes involved in relating to others and how these might influence the quality of caregiver-infant interactions.

Thus, the current study aimed to investigate whether a leftward cradling bias is present in males to the same extent as in females. The study also aimed to investigate the relationship between cradling bias and caregiving experience as well as several potential predictors, namely attachment style, hemispheric lateralisation for processing facial emotion, and autistic traits. Investigation of the above-mentioned factors in a male sample may yield further insights into how leftward cradling bias might be facilitated by social-affective

attachment processes that underlie our capacity for empathy and facilitate caregiver-infant interactions and bonding. We investigated the following hypotheses:

H_1: Leftward cradling bias would be present in similar proportion to that observed in female samples

H_2: Leftward cradling bias would be associated with a greater degree of caregiving experience

H_3: Leftward cradling bias would be associated with a more secure attachment style

H_4: Leftward cradling bias would be associated with stronger right hemispheric lateralisation for processing facial emotions

H_5: Leftward cradling bias would be associated with lower levels of autistic traits

Methods

Design and Setting.

The present study utilised a cross-sectional correlational design to examine the relationship between cradling bias and caregiving experience as well as investigate several potential predictors of leftward cradling bias in males, namely attachment style, hemispheric lateralisation, and level of autistic traits. Study sessions involving student and staff participants were held in the meeting rooms of the Psychology Department at the University of Cape Town (UCT). Study sessions involving non-student participants were conducted in quiet, distraction-free settings suitable to both the researcher and the participants.

Participants.

A total of 98 participants were initially recruited by means of convenience sampling through research invitations published electronically via the UCT Psychology Department's Student Research Participation Programme (SRPP) as well as through the Department of Student Affairs (DSA) (see Appendices A and B). Non-student participants were recruited by means of snowball sampling, whereby the principal researcher identified potential participants from their personal contact lists (see Appendix C). These participants were then asked to recommend other individuals who met the eligibility criteria for the study.

Eligibility Criteria. Only males were included in the study. In order to gain a more accurate sense of individuals' caregiving experience and avoid situations in which individuals possess multiple levels of experience, males with grandchildren were not included in the study. Participants reporting any history of neurological conditions (e.g., epilepsy or traumatic brain injury), clinically diagnosed psychiatric conditions (e.g., anxiety disorder or major depressive disorder), as well as those currently taking any psychiatric or chronic medication were excluded from the study. Participants were not excluded on the basis of culture or ethnicity since these variables are not shown to exert any influence over cradling bias display (Harris, 2010; Negayama et al., 2010).

Measures

Demographics Questionnaire. This self-report measure served as a means of determining participants' eligibility for the study (see Appendix G).

Cradling Bias Task. The study employed an imaginary cradling task modelled primarily after that of Harris, Almerigi, Carbary, and Fogel (2001). The task consisted of four separate trials presented electronically by the researcher to participants via a laptop screen. Although previous studies have generally made use of three cradling trials, this practice risks

imposing a statistical bias and does not allow the possibility for participants to display no bias. Each of the trials was administered independently between each of the other measures so as to establish a reliable measure of cradling bias (see Procedure). During each trial, participants were shown a behavioural prompt accompanied by a cradling position demonstration (as illustrated in Figure 1):

> Imagine that you are holding a small infant in your arms. Try to imagine the infant's face, eyes, mouth, body, and arms. Now position your arms as if you were gently soothing the infant or putting it to sleep. Turn your head to look at the infant's face. To which side are you looking? To your left or right side?
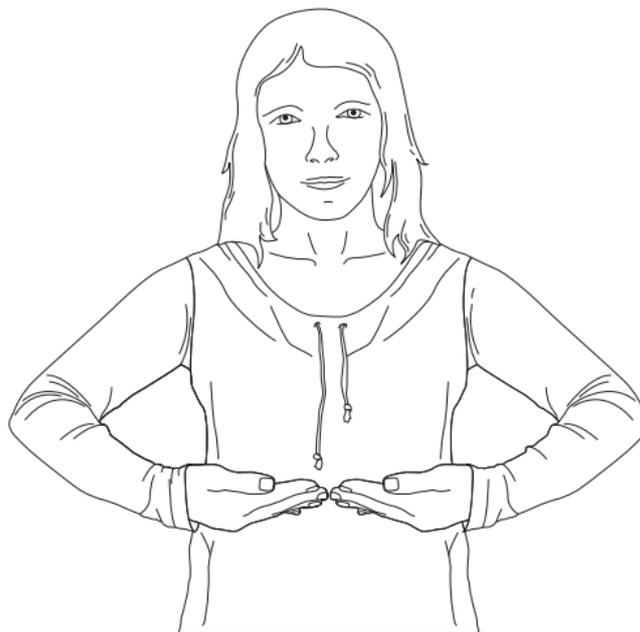
Figure 1. Demonstration of the cradling position (taken from "Cradling bias is absent in children with autism spectrum disorders" by Pileggi, Malcolm-Smith, Hoogenhout, Thomas, and Solms, 2013, *Journal of Child and Adolescent Mental Health*, *25*(1), p. 57)

Participants were required to act out the imaginary scenario and cradling side direction was recorded by the researcher. Cradling side was determined by the side to which participants reported holding the infant's head (either left or right) across each of the trials. Each instance of leftward cradling was awarded a score of -1 and each instance of rightward cradling was awarded a score +1 to produce a scale ranging from +4 (indicating a strong right bias) to -4 (indicating a strong left bias). For example, if a participant cradled to the left three times (-3) and cradled once to the right (+1), they received a score of -2, indicating a leftward bias. An equal number of left and right cradling displays resulted in a score of 0, indicating a

non-bias. Thus, cradling bias was coded as continuous so as to assess participants' degree of bias.

   Chimeric Face Test (CFT). The free-viewing CFT is a widely-used measure of hemispheric asymmetry that has demonstrated consistent patterns of hemispheric lateralisation for the processing of facial emotion (Kim & Levine, 1991). The study utilised a computerised version of the original test developed by Levy, Heller, Banich and Burton (1983). The test consists of 20 pairs of chimeric faces which are presented individually over consecutive trials. The chimeric face stimuli are constructed from two vertically split photographs of an individual's face such that one half displays an emotive expression (e.g., happiness) and the other half a neutral expression. In each pair, the two chimeric faces are placed one above the other on the same vertical axis as mirror images (see Figure 2). Thus, one face displays an emotive expression in the viewer's left visual field (LVF) and the other displays an emotive expression in the viewer's right visual field (RVF). The presentation of these face pairs is randomised and the mirrored positions of each pair is counterbalanced, such that half of the face pairs exhibit a left emotive expression at the top and the other half exhibit a left emotive expression at the bottom.

Figure 2. Example trial from the CFT (taken from "When left means right: An explanation of the left cradling bias in terms of right hemisphere specializations" by Bourne & Todd (2004), *Developmental Science*, *7*(1), p. 21)

In each trial, participants were positioned centrally in front of a laptop screen and required to select which of the two faces they perceive to be the "happiest". Participants were given 4 seconds to examine each of the faces and 5 seconds to record their answers on a response sheet. Chimeric face test laterality quotients (CFT-LQ) were calculated based on the number of LVF responses and ranged from -1 (always selecting the positive emotion expression in the RVF, indicating left hemisphere dominance) to +1 (always selecting the positive emotion expression in the LVF, indicating right hemisphere dominance). Thus, negative scores denote left hemisphere dominance for the processing of positive facial emotions and positive scores denote right hemisphere dominance for the processing of positive facial emotions.

Edinburgh Handedness Inventory (EHI). The study utilised the short form of the EHI (Oldfield, 1971) to determine participants' handedness (see Appendix H). The EHI is a four-item assessment tool that has served as the primary measure of hand dominance for studies around cradling bias largely as a result of its good test-retest reliability (Knecht, 2000; Verdino & Dingman, 1998). The items on the inventory relate to simple, everyday tasks such as writing and brushing one's teeth. Handedness laterality quotients (LQ) range between -1.00 (Always Left) and 1.00 (Always Right). Participants were categorised according to their LQ as right-handed (LQ > +0.60), mixed-handed/ambidextrous (+0.60 > LQ > 0.60), or left-handed (LQ < -0.60).

Experience in Close Relationships-Revised (ECR-R) Questionnaire. The ECR-R (Fraley, Waller, & Brennan, 2000) is a widely used self-administrable measure of adult attachment style (see Appendix I). The ECR-R consists of 36 items on a 7-point Likert scale that measure two subscales of attachment, namely Avoidance and Anxiety. According to this scale, individuals high on avoidance experience difficulty in close relationships and try to maintain independence, while Anxious individuals find difficulty being alone or being rejected by attachment figures. The revised version of the scale was developed using items selected from the original ECR item pool and is used to assess the same components of Avoidance and Anxiety. The ECR-R has high validity, internal consistency, and good test-retest reliability (Sibley & Lui, 2004; Vogel & Wei, 2005).

Autism Spectrum Quotient (AQ). The present study employed the AQ as a measure of autistic traits (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001; see Appendix J). The AQ was developed as a short, self-administrable tool for assessing the extent to which neurotypical adults with normal intellectual functioning possess traits related to the autism spectrum. The scale includes 50 items which target five different domains, namely social skills, communication, imagination, attention to detail, and attention switching.

Responses to items are scaled on a 4-point Likert format (definitely agree, slightly agree, slightly disagree, and definitely disagree). Participants are awarded a maximum of 1 point if they respond either strongly or mildly to the autistic or atypical behaviour described in each item. Other responses are awarded a score of zero and items are summed for a total score ranging between 0 and 50. A score of 32 or higher is said to signal a clinically significant level of autistic traits. That being said, attainment of such a score or higher may not warrant an ASD diagnosis. The AQ possesses good test-retest reliability and interrater reliability (Baron-Cohen et al., 2001).

Caregiving Experience Questionnaire (CEQ). This questionnaire was designed to assess individual's caregiving experiences (see Appendix K). Participants are asked about their involvement in child-rearing and categorised according to predominant caregiving experience to ensure independence. The CEQ assesses participants' child-rearing involvement with any of their own children or children they are directly responsible for as well as any siblings or extended family. Participants were ultimately categorised as having either 'parenting experience' (experience with their own children, either biological or through legal guardianship), 'sibling/family experience' (experience caring for infant siblings), 'other experience' (experience with any other young children, either through babysitting or through charity), or 'no experience'.

Procedure

The study was granted ethical clearance by the Ethics Review Committee of the UCT Psychology Department (see Appendix L). Research invitations were disseminated through the various platforms and participants were required to sign up for an available session through the SRPP Vula site or arrange a date and time with the researcher via email in the case where participants were recruited externally. During each study session, participants met with the researcher outside of the meeting room in the psychology department. In cases where sessions were conducted off-campus, participants met with the researcher at the agreed upon venue. Participants were told the study aimed to investigate bonding in infant-caregiver interactions. The researcher then provided a brief and detailed verbal description of the

procedure to be followed before asking participants to sign an informed consent form (see Appendix D and E). A basic demographics form was then be completed and where participants failed to meet the eligibility criteria, they were kindly thanked for their time and asked to leave.

Each of the four cradling trials was performed independently between administering each of the other measures: Participants performed their first cradling trial before completing the ECR-R and then performed a second cradling trial. Participants were then required to complete the AQ before completing a third cradling trial. Participants were then asked to complete the CFT before carrying out a fourth and final cradling trial.

Participants then completed the EHI and, finally, the researcher administered the P-CES with the participant. Each session lasted approximately 30-45 minutes. All participants were verbally debriefed on the study and its aims and given the opportunity to ask questions around the study and its aims (see Appendix F). All psychology students were awarded 2 SRPP points upon completing the study. Participants recruited externally and through the DSA and who fully participated in the study were given entry into a R1000 cash-prize raffle after fully participating in the study. Upon completion of data collection, one participant was randomly selected as the winner of the raffle and awarded the R1000 cash prize. The data obtained from these participants was kept confidential and stored on a password-protected device.

Data Management and Statistical Analyses

All statistical analyses were performed using SPSS® Statistics Version 25.0 with significance set to alpha (α) = .05 as per convention (Field, 2009). The relevant assumptions underlying each method of statistical analysis were upheld. Chi-squared tests of contingency were carried out on categorical data for both handedness and caregiving experience. For the purpose of descriptive statistics as well as chi-squared analyses, cradling bias was coded as a categorical variable (i.e., as either Left or Not Left). A hierarchical regression analysis was carried out to investigate potential predictors of cradling bias, namely two subscales of attachment-related anxiety and avoidance, hemispheric laterality for processing facial emotions, and autistic traits. The data obtained on each of these measures was deemed appropriate for the regression model. Cradling bias was coded as a continuous outcome variable for the purposes of the regression analysis (see Measures). An a priori power analysis indicated an appropriate sample size of $N = 85$ given input parameters of $\alpha = .05$, power ($1-\beta$) = .80, a medium effect size (f^2) estimate of .15, and 4 predictor variables in the regression model (Faul, Erdfelder, Buchner, & Lang, 2009).

Results

Sample Characteristics. The final sample consisted of 90 participants ($M = 25.37$, $SD = 9.32$, age range 18–56). The distribution of handedness in the original dataset was considered inappropriate for inclusion in the hierarchical regression model as only 3 participants were left-handed and 5 were mixed-handed.[2] In addition, a chi-squared test of contingency between cradling bias and handedness was not conducted as the empty cell counts would prevent any worthwhile inferences based on the results. In an effort to maintain a more homogenous sample, data obtained from the 3 left-handed and 5 mixed-handed participants were excluded from subsequent analyses ($N = 90$).

Cradling Bias. Recall that cradling bias is coded as a categorical variable for the purpose of descriptive statistics. The distribution of cradling bias corresponded to that regularly observed in adult females, with approximately 77% of exhibiting a leftward cradling bias. A chi-squared goodness-of-fit test comparing this proportion to the maximum expected prevalence of 80% in females indicated no significance difference in leftward cradling proportions between males and females, $\chi^2(1, n = 90) = .56$, $p = .453$.

Caregiving Experience. A chi-squared test of contingency revealed that cradling bias was not contingent on caregiving experience, $\chi^2(3, n = 86) = 1.15$, $p = .798$, Fisher's Exact Test (FET).

Table 1.

Frequency and Percentage of Cradling Bias According to Caregiving Experience (N = 90)

Cradling Bias	Caregiving Experience			
	Parents	Sibling	Other	No Experience
Left	13 (76.47%)	20 (74.07%)	12 (85.71%)	21 (65.63%)
Not Left [a]	4 (23.53%)	7 (35.00%)	2 (14.29%)	11 (34.38)

[a] Participants who displayed a non-biased cradling preference were grouped under the 'Not Left' category ($n = 4$).

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[2] It should be noted that the distribution of handedness did not differ greatly from the population distribution as most participants were right-handed and very few were left-handed. Normally, however, fewer mixed-handers are expected than left-handers, which was not the case in this sample (see Annett, 2004).

Hierarchical Regression Analysis. The hierarchical regression model was derived theoretically. The two ECR-R attachment-related scales of avoidance and anxiety were entered first together into the model as there are arguments around how adult attachment styles may reflect the quality of early bonding and relating behaviours thought to facilitate the display of leftward cradling bias. Considering the growing body of evidence which suggests how a right hemispheric advantage for processing facial emotions in the contralateral side of visual space may contribute to leftward cradling bias, laterality quotients (as measured by the CFT) were then entered into the model. Finally, traits related to the autism spectrum (as measured by the AQ) were entered into the model as previous studies using regression analysis have yielded have yielded a relationship between ASD diagnosis and leftward cradling bias. Thus, in line with previous findings, AQ traits are expected to have an effect on cradling side over and above the influence of any other variables.

All variables, apart from Avoidance, $r = -.14$, $p = .086$ were significantly correlated with cradling bias (see Table 2).

Table 2.

Intercorrelations Between Potential Predictors and Cradling Bias

	Cradling Bias	Avoidance	Anxiety	CFT	AQ
Cradling Bias	-	-.14	-.19*	-.27**	.22*
Avoidance		-	.54***	.09	.19*
Anxiety			-	.54**	.09
CFT				-	.19*
AQ					-

$* p < .05.$ $** p < .01.$ $*** p < .001.$

The results of the regression analysis revealed that the overall model was significant, $F(1, 85) = 7.64$, $p = .007$, $R^2 = .17$. The addition of CFT to the model explained an additional 6.20% of variance in Cradling Bias, $R^2 = .10$, $p = .013$. The introduction of AQ into the model uniquely explained a further 6.90% of the variance in Cradling Bias, $R^2 = .17$, $p = .007$. Avoidance and Anxiety attachment-related scales did not contribute significantly to the model, $R^2 = .04$, $p = .170$. Overall, the results indicate that a model with both CFT and AQ as predictors of Cradling Bias would be better. A subsequent regression analysis using only CFT and AQ as predictors of Cradling Bias in the model generated a significant result, $F (2, 87)$, $p = .002$. The final model explained 12.7% of the variance in Cradling Bias.

Discussion

The study aimed to investigate the prevalence of cradling bias in males and its relation to several theoretically-relevant factors. Approximately 77% of participants cradled towards the left which was found to be statistically equivalent to what is expected in female samples. Contrary to expectation, caregiving experience was not associated with leftward cradling bias. In line with existing theory, hemispheric lateralisation for processing facial emotions and traits related to the autism spectrum were both significant predictors of leftward cradling bias. Attachment-related avoidance and anxiety scales, however, did not significantly predict leftward cradling bias.

The finding that males exhibit a similar rate of leftward cradling bias to females not only highlights the paucity of research conducted in males but partly explains the lack of association between cradling bias and caregiving experience. There may be that no sex differences with respect to the underlying mechanism of cradling bias. Thus, the lack of association to caregiving seems less surprising and ultimately highlights the need for further cradle bias research on males. Another issue is that older and recent studies investigating the influence of caregiving experience are subject to methodological inconsistencies around quantifying experience. Some have measured caregiving experience as a dichotomous variable (e.g., whether or not one has every cared for infants or young children), which fails to consider frequency or length of contact (e.g., Bundy, 1979). Others have used parity (i.e., one's number of children) as a measure of caregiving experience, which arguably reveals very little around the degree and quality of an individual's experience with infants or young children (e.g., Scola & Vauclair, 2010). It is therefore understandable that the results of these studies show mixed effects for caregiving experience on male cradling bias.

Moreover, strong evidence from recent studies in fathers and young children suggest that no such relationship exists (e.g., Forrester et al., 2018; Pileggi et al., 2015, Scola & Vauclair, 2010). In these studies, male (as well as female) children demonstrate a leftward cradling bias, i.e., a male leftward cradling bias is demonstrated in the absence of caregiving experience, indicating no sex difference as well as a non-relationship to caregiving experience. The apparent evolutionary origin of the leftward cradling bias seems to support this observation as one would expect the bias to present somewhere early in the developmental period without any influence on previous experience.   This study is also one of the few to demonstrate a link between leftward cradling bias and hemispheric specialisation for facial emotion processing in males. Participants who exhibited greater right

hemispheric lateralisation for processing facial emotions in the CFT also exhibited a high degree of leftward cradling, indicating how males might also be subject to the same underlying mechanisms that are present in females. This finding also provides strong support not only for the hemispheric specialisation hypothesis but also for hemispheric specialisation theory at large. Numerous studies show that even in other primate (e.g., bonobos) and non-primate (e.g., walruses and fruit bats) mammalian species exhibit a distinct left-side visual bias (and thus, right hemispheric advantage) for processing social-affective cues of others, particular facial affective cues (Hopkins, Taglialatela, Leavens, Russel, & Schaprio, 2010; Karenina et al., 2017). Even studies in children note that even the most basic facial configurations (e.g., three dots on a blank doll resembling two eyes and a mouth) are sufficient to elicit a leftward cradling bias (Forrester et al., 2018). Hence, there is strong evidence in support of the hemispheric specialisation hypothesis in cradling bias and how this most likely reflects evolutionarily-based advantages for facial emotion processing.

However, although these findings may explain why leftward cradling is advantageous with respect to facial emotion processing, they may not fully account for all cerebral explanations. Indeed, attachment-related anxiety and avoidance scales did not significantly predict cradling bias. This is unexpected, given the argument that the leftward cradling is facilitated by basic social-affective attachment processes that underlie our capacity to relate and form close bonds with others, particularly the bond between caregivers and infants. The findings here do not lend direct support to the social-affective attachment theory of cradling, since cradling was not shown to influence the type or quality of bonds reported by participants.

However, the mechanisms through which bonds are thought to arise, i.e., bottom-up empathic relating, did appear to indirectly influence cradling side. Autistic traits were strong predictors of cradling bias in that they significantly predicted a reduced leftward cradling bias. The core deficit of ASD (and consequently that exhibited in those with high autistic traits) concerns the capacity to relate to others. There is clearly something inherent in those with ASD and autistic traits (e.g., Fleva & Khan, 2015; Pileggi et al., 2015) that inhibits the display of leftward cradling. When examines these core ASD deficits and how empathic abilities generally emerge through right hemispheric processing, it is clear that basic, bottom-up empathic deficits may be responsible for this reduced leftward bias. Thus, while also considering methodological issues with the study's attachment measures (discussed below), it may be that we were only able to detect the relating mechanism by which social-attachments are formed through leftward cradling, and not necessarily the type or quality of the bonds that

result from such behaviours. Nonetheless, the results as they stand do not provide complete support for the social-affective attachment theory of leftward cradling.

Limitations and Directions for Future Research

The study consisted of a small sample size drawn from mostly a university undergraduate population through a non-probability sampling method. This brings into question whether or not the findings generated from this study can be generalised back to the non-student population. Moreover, measures of attachment and autistic traits consisted of self-report questionnaires. This may have introduced a social-desirability bias whereby participants were less likely to report behaviours or attitudes that may be perceived as atypical. More robust measures of attachment should be employed where attachment is assessed in a way that is more ecologically valid, particularly in studies of actual caregivers and their infants. One such method often used in cradling bias studies in the naturalistic observation methods of mothers and fathers in maternity wards. This method allows researchers to observe naturalistic caregiver-infant attachment behaviours in relation to cradling preferences that cannot be adequately achieved through self-report questionnaires where style and quality are difficult to assess.

In addition, more direct measures of bottom-up empathic behaviour and ability should be incorporated into cradling bias tasks such as Reading Mind in the Eyes tests. In this way, cradling biases might become a more useful variable by allowing us to establish more direct links between leftward cradling and perceptual advantages for detecting facial emotions.

Further investigations are needed into whether or not higher-order social cognition and executive functions play a role in cradling behaviours to the same extent as basic processes. Although findings suggest that this is most likely not the case (e.g., the presence of leftward cradling bias in lower-order mammals as well as in those with intellectual impairment), studies are nonetheless required to back up this claim. Thus, more cradling bias investigations into specific populations with social cognition deficits other than those with ASD might serve as a useful method of clarifying this issue.

It may also be useful to examine neural activation patterns and hormone level fluctuations (e.g., oxytocin) associated with bonding and attachment during cradling activities in order to gain further insights into the neurobiology of empathy and attachment bonding.

Summary and Conclusions

This study adds to one of the few which have examined the relationship between ASD and autistic traits in relation to leftward cradling bias. Research on the bottom-up processes implicated in ASD remains underexamined compared to higher-order processes associated

with the condition. Investigating lateralised cradling behaviours and the social-affective advantages they are thought to confer onto caregivers and infants may provide ways of investigating these more basic empathic processes in those with or without ASD. More specifically, cradling bias research may offer us a useful means of assessing how humans and other mammals relate to one another on a basic social-affective level. In conclusion, our study shows that males exhibit a leftward cradling bias at a rate not significantly different from that of females. Moreover, this leftward bias was not contingent on caregiving experience and regression analyses revealed how hemispheric lateralisation for facial emotion processing and autistic traits—but not attachment style—significantly predicted leftward cradling bias. These results provide strong evidence for the hemispheric specialisation hypothesis and partial support for the social-affective attachment theory of cradling. There are clearly multiple factors that give rise to the leftward cradling phenomenon, all of which are related directly and indirectly to evolutionary-based specialisations of the right hemisphere.

Acknowledgements

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SRPP Advertisement

Looking for Males to Participate in Research Study (2 SRPP Points)

Dear students,

You are invited to participate in a research study investigating bonding in male caregiver-infant relationships. If you choose to participate in this study, you will be required to complete one practical task, one computerised task, three self-administrable questionnaires, and one interview-style questionnaire. The entire session should take **45 – 60 minutes** to complete and you will receive **2 SRPP points** for your participation. **If you arrive more than 15 minutes late for your scheduled study session, you will not be permitted to complete the session but will be allowed to reschedule.** Please note that all participants' identities and personal data will not be disclosed to anyone other than the principal researcher. In addition, the devices used to store and work on the data collected from participants will be physically secured and password protected. If you wish to participate in this study, you may sign up via the 'Sign-up' tab.

Venue: **ACSENT Laboratory, Psychology Department, Upper Campus**

Please note the following eligibility criteria:

- − Male
- − Over 18 years of age
- − **No grandchildren**

Please contact Lasse Herdien (hrdlas001@myuct.ac.za) for any questions regarding participation in the study.

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Research Invitation (Department of Student Affairs)

Looking for Males to Participate in Research Study

Dear students,

You are invited to participate in a research study investigating bonding in male caregiver-infant relationships. If you choose to participate in this study, you will be required to complete one practical task, one computerised task, three self-administrable questionnaires, and one interview-style questionnaire. The entire session should take **45 – 60 minutes** to complete. **<u>Full participation in the study will guarantee you automatic entry into a raffle for the chance to win a R1000 cash prize.</u>** If you arrive more than 15 minutes late for a scheduled study session, you will not be permitted to complete the session but may be allowed to reschedule. Please note that all participants' identities and personal data will not be disclosed to anyone other than the principal researcher. In addition, the devices used to store and work on the data collected from participants will be physically secured and password protected. At the end of the study, one participant will be randomly selected as the winner of the cash prize and will be notified telephonically of the result. If you wish to participate in this study, please contact the principal researcher: Lasse Herdien (hrdlas001@myuct.ac.za).

Venue: **ACSENT Laboratory, Psychology Department, Upper Campus**

Please note the following eligibility criteria:

- Male
- Over 18 years of age
- No grandchildren

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UCT Psychology Research Invitation

Looking for Males to Participate in Research Study

Dear students,

You are invited to participate in a research study investigating bonding in male caregiver-infant relationships. Each study session will involve completion of one practical task, one computerised task, three self-administrable questionnaires, and one interview-style questionnaire. The entire session should take **45 – 60 minutes** to complete. <u>**Full participation in the study will guarantee you automatic entry into a raffle for the chance to win a R1000 cash prize.**</u> If you arrive more than 15 minutes late for a scheduled study session, you will not be permitted to complete the session but may be allowed to reschedule. Please note that all participants' identities and personal data will not be disclosed to anyone other than the principal researcher. In addition, the devices used to store and work on the data collected from participants will be physically secured and password protected. At the end of the study, one participant will be randomly selected as the winner of the cash prize and will be notified telephonically of the result. If you wish to participate in this study, please contact the principal researcher: Lasse Herdien (hrdlas001@myuct.ac.za).

Venue: **ACSENT Laboratory, Psychology Department, Upper Campus**

Please note the following eligibility criteria:

- Male
- Over 18 years of age
- **No grandchildren**

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<div align="center">**Appendix D**

SRPP Informed Consent</div>

Dear participant,

Thank your choosing to take part in this study investigating bonding in male caregiver-infant relationships in males.

Procedure

If you decide to participate in this study, you will be asked to complete one practical task, one computerised task, three self-administrable questionnaires, and one interview-style questionnaire. The entire study session should last 45 – 60 minutes.

Possible risks and benefits

There are no known risks involved in this study and its procedures. You will receive **2 SRPP** points after participating in the study. Please note that participation in this study is completely voluntary and you are free to change your mind and discontinue participation at any time without any effect on your relationship with UCT or the department. Please note that if you do choose to withdraw from the study, you will *not* be allocated any SRPP points. After participating in the study, you will receive detailed information regarding its specific aims and hypotheses.

Confidentiality

Information about you collected for this study will be kept confidential. Your consent form and any other identifying information will not be disclosed to anybody else but the principal researcher. Any reports about this study will not identify you or any other participant. The equipment and devices used to analyze the data collected from this study will be password protected and physically secured by the researcher.

This study has been approved by the Department of Psychology at The University of Cape Town. Any study-related questions or issues should be directed to any of the following individuals:

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If you are willing to comply with the study and its procedure, please complete the consent form.

I have read the consent form and am satisfied with my understanding of the study and its possible risks and benefits. I hereby voluntarily consent to participation in the research study as described.

--   ------------------------------

Signature of participant   **Date (DD/MM/YYYY)**

--   ------------------------------

Name of participant (printed)   **Student Number**

Course Code

<center>**Appendix E**</center>

<center>**Non-SRPP Informed Consent**</center>

Dear participant,

Thank your choosing to take part in this study investigating bonding in male caregiver-infant relationships in males.

Procedure

If you decide to participate in this study, you will be asked to complete one practical task, one computerised task, three self-administrable questionnaires, and one interview-style questionnaire. The entire study session should last 45 – 60 minutes.

Possible risks and benefits

There are no known risks involved in this study and its procedures. Please note that participation in this study is completely voluntary and you are free to change your mind and discontinue participation at any time without any effect on your relationship with UCT or the department. **Upon completion of the study you will be automatically entered into raffle for the chance to win a R1000 cash prize. At the end of the study, one participant will be randomly selected as the winner of the cash prize and will be telephonically of the result**. Please note that if you do choose to withdraw from the study at any point before its conclusion, you will *not* be permitted entry into the raffle. After participating in the study, you will receive detailed information regarding its specific aims and hypotheses.

Confidentiality

Information about you collected for this study will be kept confidential. Your consent form and any other identifying information will not be disclosed to anybody else but the principal researcher. Any reports about this study will not identify you or any other participant. The equipment and devices used to analyze the data collected from this study will be password protected and physically secured by the researcher.

This study has been approved by the Department of Psychology at The University of Cape Town. Any study-related questions or issues should be directed to any of the following individuals:

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If you are willing to comply with the study and its procedure, please complete the consent form.

I have read the consent form and am satisfied with my understanding of the study and its possible risks and benefits. I hereby voluntarily consent to participation in the research study as described.

--   -----------------------------

Signature of participant   **Date (DD/MM/YYYY)**

--   -----------------------------

Name of participant (printed)   **Contact number:**

Debriefing Form

Investigating predictors of cradling bias in males

Dear participant,

Thank you for participating in this study. This form aims to provides you with information about research study and its aims as well an explanation of the various measures used.

The aim of this study was not to investigate bonding in male caregiver-infant relationships in males but rather to investigate several under-examined factors that might predict cradling bias in males. Cradling bias refers to the tendency to cradle on the left side of the body while trying to soothe or put an infant to sleep and is a well-established human phenomenon. A leftward cradling bias can be observed in approximately 70–85% of human females across different cultures and historical periods and even in similar ratios among female members of certain primate species. However, while a leftward cradling bias in females is well-documented, it is unclear to what extent leftward cradling bias is evident in males. The study in question aimed to investigate several potential predictors of cradling bias in males, namely parenting-caregiving experience, which brain hemisphere we use to process emotions, attachment style, and autistic traits.

It was there necessary to conceal the true aims of the study in order for you to not form any specific ideas about the study and its aims that could potentially influence your performance on certain tasks, specifically the cradling bias task.

If you, for any reason, experience any distress or anger as a result of participating in the study or from learning of the deception used therein, please direct these issues to one the following individuals.

Principal researcher
Lasse Herdien
Department of Psychology
University of Cape Town
hrdlas001@myuct.ac.za

Supervisor
Lea-Ann Pileggi, PhD
Department of Psychology
University of Cape Town
lea-ann.pileggi@uct.ac.za
(021) 650 3420

Postgraduate Administrative Assistant
Rosalind Adams
Department of Psychology
University of Cape Town
rosalind.adams@uct.ac.za
(021) 650 4104

Appendix G

Demographics Questionnaire

Name:

Surname:

Student number (if applicable):

Age: _____

Sex:

Male	Female	Other (please specify) _____

Do you have any children of your own?

Yes	No

Do you have any grandchildren?

Yes	No

Do you have any history of neurological conditions (e.g., epilepsy, head injuries, ADHD)?

Yes	No	**Other (please specify): _____**

Do you have any history of clinically diagnosed psychiatric conditions (e.g., depression, anxiety, bipolar disorder, post-traumatic stress disorder)?

Yes	No	**Other (please specify): _____**

Are you currently taking any psychiatric medication?

Yes	No

If so, please specify _____

Appendix H

Edinburgh Handedness Inventory

Please indicate your preferences in the use of hands in the following activities.

	Always Right	Usually Right	Both Equally	Usually Left	Always Left
1. Writing	☐	☐	☐	☐	☐
2. Drawing	☐	☐	☐	☐	☐
3. Throwing	☐	☐	☐	☐	☐
4. Scissors	☐	☐	☐	☐	☐
5. Toothbrush	☐	☐	☐	☐	☐
6. Knife	☐	☐	☐	☐	☐
7. Spoon	☐	☐	☐	☐	☐
8. Hammer	☐	☐	☐	☐	☐
9. Screwdriver	☐	☐	☐	☐	☐
10. A brush or comb	☐	☐	☐	☐	☐
11. Tennis Racket	☐	☐	☐	☐	☐
12. Cricket bat	☐	☐	☐	☐	☐
13. Golf club	☐	☐	☐	☐	☐
14. Broom (upper hand)	☐	☐	☐	☐	☐
15. Rake (upper hand)	☐	☐	☐	☐	☐
16. Striking a match	☐	☐	☐	☐	☐
17. Deal cards	☐	☐	☐	☐	☐
18. Opening a jar	☐	☐	☐	☐	☐
19. Using a key	☐	☐	☐	☐	☐
20. Threading a needle	☐	☐	☐	☐	☐

Appendix I

The Experiences in Close Relationships-Revised (ECR-R) Questionnaire

The statements below concern how you feel in emotionally intimate relationships. We are interested in how you generally experience relationships, not just in what is happening in a current relationship. Respond to each statement by circling a number to indicate how much you agree or disagree with the statement.

1=Strongly Disagree…7=Strong Agree

Statement	1	2	3	4	5	6	7
1. I'm afraid that I will lose my partner's love.	1	2	3	4	5	6	7
2. I worry about being abandoned.	1	2	3	4	5	6	7
3. I am very comfortable being close to romantic partners.	1	2	3	4	5	6	7
4. I worry a lot about my relationships.	1	2	3	4	5	6	7
5. Just when my partner starts to get close to me I find myself pulling away.	1	2	3	4	5	6	7
6. I worry that romantic partners won't care about me as much as I care about them.	1	2	3	4	5	6	7
7. I get uncomfortable when a romantic partner wants to be very close.	1	2	3	4	5	6	7
8. I worry a fair amount about losing my partner.	1	2	3	4	5	6	7
9. I don't feel comfortable opening up to romantic partners.	1	2	3	4	5	6	7
10. I often wish that my partner's feelings for me were as strong as my feelings for him/her.	1	2	3	4	5	6	7
11. I want to get close to my partner, but I keep pulling back.	1	2	3	4	5	6	7
12. I often want to merge completely with romantic partners, and this sometimes scares them away.	1	2	3	4	5	6	7
13. I am nervous when partners get too close to me.	1	2	3	4	5	6	7
14. I worry about being alone.	1	2	3	4	5	6	7
15. I feel comfortable sharing my private thoughts and feelings with my partner.	1	2	3	4	5	6	7

16. My desire to be very close sometimes scares people away.	1	2	3	4	5	6	7
17. I try to avoid getting too close to my partner.	1	2	3	4	5	6	7
18. I need a lot of reassurance that I am loved by my partner.	1	2	3	4	5	6	7
19. I find it relatively easy to get close to my partner.	1	2	3	4	5	6	7
20. Sometimes I feel that I force my partners to show more feeling, more commitment.	1	2	3	4	5	6	7
21. I find it difficult to allow myself to depend on romantic partners.	1	2	3	4	5	6	7
22. I do not often worry about being abandoned.	1	2	3	4	5	6	7
23. I prefer not to be too close to romantic partners.	1	2	3	4	5	6	7
24. If I can't get my partner to show interest in me, I get upset or angry.	1	2	3	4	5	6	7
25. I tell my partner just about everything.	1	2	3	4	5	6	7
26. I find that my partner(s) don't want to get as close as I would like.	1	2	3	4	5	6	7
27. I usually discuss my problems and concerns with my partner.	1	2	3	4	5	6	7
28. When I'm not involved in a relationship, I feel somewhat anxious and insecure.	1	2	3	4	5	6	7
29. I feel comfortable depending on romantic partners.	1	2	3	4	5	6	7
30. I get frustrated when my partner is not around as much as I would like.	1	2	3	4	5	6	7
31. I don't mind asking romantic partners for comfort, advice, or help.	1	2	3	4	5	6	7
32. I get frustrated if romantic partners are not available when I need them.	1	2	3	4	5	6	7
33. It helps to turn to my romantic partner in times of need.	1	2	3	4	5	6	7
34. When romantic partners disapprove of me, I feel really bad about myself.	1	2	3	4	5	6	7
35. I turn to my partner for many things, including comfort and reassurance.	1	2	3	4	5	6	7
36. I resent it when my partner spends time away from me.	1	2	3	4	5	6	7

Appendix J

Autism Spectrum Quotient (AQ)

Below is a list of statements. Please read each statement very carefully and rate how strongly you agree or disagree with it by circling your answer.

1. I prefer to do things with others rather than on my own.	definitely agree	slightly agree	slightly disagree	definitely disagree
2. I prefer to do things the same way over and over again.	definitely agree	slightly agree	slightly disagree	definitely disagree
3. If I try to imagine something, I find it very easy to create a picture in my mind.	definitely agree	slightly agree	slightly disagree	definitely disagree
4. I frequently get so strongly absorbed in one thing that I lose sight of other things.	definitely agree	slightly agree	slightly disagree	definitely disagree
5. I often notice small sounds when others do not.	definitely agree	slightly agree	slightly disagree	definitely disagree
6. I usually notice car number plates or similar strings of information.	definitely agree	slightly agree	slightly disagree	definitely disagree
7. Other people frequently tell me that what I've said is impolite, even though I think it is polite.	definitely agree	slightly agree	slightly disagree	definitely disagree
8. When I'm reading a story, I can easily imagine what the characters might look like.	definitely agree	slightly agree	slightly disagree	definitely disagree
9. I am fascinated by dates.	definitely agree	slightly agree	slightly disagree	definitely disagree
10. In a social group, I can easily keep track of several different people's conversations.	definitely agree	slightly agree	slightly disagree	definitely disagree
11. I find social situations easy.	definitely agree	slightly agree	slightly disagree	definitely disagree
12. I tend to notice details that others do not.	definitely agree	slightly agree	slightly disagree	definitely disagree
13. I would rather go to a library than a party.	definitely agree	slightly agree	slightly disagree	definitely disagree
14. I find making up stories easy.	definitely agree	slightly agree	slightly disagree	definitely disagree
15. I find myself drawn more strongly to people than to things.	definitely agree	slightly agree	slightly disagree	definitely disagree

16. I tend to have very strong interests which I get upset about if I can't pursue.	definitely agree	slightly agree	slightly disagree	definitely disagree
17. I enjoy social chit-chat.	definitely agree	slightly agree	slightly disagree	definitely disagree
18. When I talk, it isn't always easy for others to get a word in edgeways.	definitely agree	slightly agree	slightly disagree	definitely disagree
19. I am fascinated by numbers.	definitely agree	slightly agree	slightly disagree	definitely disagree
20. When I'm reading a story, I find it difficult to work out the characters' intentions.	definitely agree	slightly agree	slightly disagree	definitely disagree
21. I don't particularly enjoy reading fiction.	definitely agree	slightly agree	slightly disagree	definitely disagree
22. I find it hard to make new friends.	definitely agree	slightly agree	slightly disagree	definitely disagree
23. I notice patterns in things all the time.	definitely agree	slightly agree	slightly disagree	definitely disagree
24. I would rather go to the theatre than a museum.	definitely agree	slightly agree	slightly disagree	definitely disagree
25. It does not upset me if my daily routine is disturbed.	definitely agree	slightly agree	slightly disagree	definitely disagree
26. I frequently find that I don't know how to keep a conversation going.	definitely agree	slightly agree	slightly disagree	definitely disagree
27. I find it easy to "read between the lines" when someone is talking to me.	definitely agree	slightly agree	slightly disagree	definitely disagree
28. I usually concentrate more on the whole picture, rather than the small details.	definitely agree	slightly agree	slightly disagree	definitely disagree
29. I am not very good at remembering phone numbers.	definitely agree	slightly agree	slightly disagree	definitely disagree
30. I don't usually notice small changes in a situation, or a person's appearance.	definitely agree	slightly agree	slightly disagree	definitely disagree
31. I know how to tell if someone listening to me is getting bored.	definitely agree	slightly agree	slightly disagree	definitely disagree
32. I find it easy to do more than one thing at once.	definitely agree	slightly agree	slightly disagree	definitely disagree
33. When I talk on the phone, I'm not sure when it's my turn to speak.	definitely agree	slightly agree	slightly disagree	definitely disagree

34. I enjoy doing things spontaneously.	definitely agree	slightly agree	slightly disagree	definitely disagree
35. I am often the last to understand the point of a joke.	definitely agree	slightly agree	slightly disagree	definitely disagree
36. I find it easy to work out what someone is thinking or feeling just by looking at their face.	definitely agree	slightly agree	slightly disagree	definitely disagree
37. If there is an interruption, I can switch back to what I was doing very quickly.	definitely agree	slightly agree	slightly disagree	definitely disagree
38. I am good at social chit-chat.	definitely agree	slightly agree	slightly disagree	definitely disagree
39. People often tell me that I keep going on and on about the same thing.	definitely agree	slightly agree	slightly disagree	definitely disagree
40. When I was young, I used to enjoy playing games involving pretending with other children.	definitely agree	slightly agree	slightly disagree	definitely disagree
41. I like to collect information about categories of things (e.g. types of car, types of bird, types of train, types of plant, etc.).	definitely agree	slightly agree	slightly disagree	definitely disagree
42. I find it difficult to imagine what it would be like to be someone else.	definitely agree	slightly agree	slightly disagree	definitely disagree
43. I like to plan any activities I participate in carefully.	definitely agree	slightly agree	slightly disagree	definitely disagree
44. I enjoy social occasions.	definitely agree	slightly agree	slightly disagree	definitely disagree
45. I find it difficult to work out people's intentions.	definitely agree	slightly agree	slightly disagree	definitely disagree
46. New situations make me anxious.	definitely agree	slightly agree	slightly disagree	definitely disagree
47. I enjoy meeting new people.	definitely agree	slightly agree	slightly disagree	definitely disagree
48. I am a good diplomat.	definitely agree	slightly agree	slightly disagree	definitely disagree
49. I am not very good at remembering people's date of birth.	definitely agree	slightly agree	slightly disagree	definitely disagree
50. I find it very easy to play games with children that involve pretending.	definitely agree	slightly agree	slightly disagree	definitely disagree

Appendix K

Caregiving Experience Questionnaire (CEQ)

Section A: Caregiving Capacities

1. Own children

Number of children (including any adopted children): _____

Number of children you are directly responsible for: _____

Specify infant or child age(s):		Children				
		1	2	3	4	5
Newborn	0 – 5 weeks					
Infant	1 month – 1 year					
Toddler	1 – 3 years					
Pre-schooler	3 – 5 years					

Overall time spent caring for infant/child:	Children				
	1	2	3	4	5
Few Weeks					
Few Months					
1 year					
1 – 2 years					
3 years +					

Phase of life spent caring for infant/child		Children				
		1	2	3	4	5
Early Adolescence	9 –13					
Adolescence	13 – 18					
Early adulthood	18 – 25					
Adulthood	25 – 45					
Middle Adulthood	45 – 65					

2. Siblings and immediate family

Previously/currently involved in the care of any younger siblings: Yes ☐   No ☐

Number of younger siblings for which you are/were directly responsible: _____

Specify sibling age(s):		Siblings				
		1	2	3	4	5
Newborn	0 – 5 weeks					
Infant	1 month – 1 year					
Toddler	1 – 3 years					
Pre-schooler	3 – 5 years					

Overall time spent caring for sibling(s):	Siblings				
	1	2	3	4	5
Few Weeks					
Few Months					
1 year					
1 – 2 years					
3 years +					

Phase of life spent caring for younger sibling(s)		Siblings				
		1	2	3	4	5
Early Adolescence	9 –13					
Adolescence	13 – 18					
Early adulthood	18 – 25					
Adulthood	25 – 45					
Middle Adulthood	45 – 65					

3. Other

Have you ever been/are you currently involved in taking care of infants or young children?

Babysitter		Au pair		Day-care Supervisor		Charity		Other	

If other, please specify: _____

How many children were you responsible for?

Specify infant or child age(s):		Siblings				
		1	2	3	4	5
Newborn	0 – 5 weeks					
Infant	1 month – 1 year					
Toddler	1 – 3 years					
Pre-schooler	3 – 5 years					

Overall time spent caring for infant/child:	Children				
	1	2	3	4	5
Few Weeks					
Few Months					
1 year					
1 – 2 years					
3 years +					

Phase of life spent caring for infant/child		Children				
		1	2	3	4	5
Early Adolescence	9 –13					
Adolescence	13 – 18					
Early adulthood	18 – 25					
Adulthood	25 – 45					
Middle Adulthood	45 – 65					

<u>Section B: Basic Care</u>

Questions around basic care:

How often would/do you spend:

1. Feeding

Never	**Rarely**	**Sometimes**	**Often**	**Always**
☐	☐	☐	☐	☐

2. Cleaning (grooming, bathing, changing nappies, wiping faces, etc.)

Never	**Rarely**	**Sometimes**	**Often**	**Always**
☐	☐	☐	☐	☐

3. Dressing

Never	**Rarely**	**Sometimes**	**Often**	**Always**
☐	☐	☐	☐	☐

4. Monitoring/supervising activities

Never	**Rarely**	**Sometimes**	**Often**	**Always**
☐	☐	☐	☐	☐

Section C: Social-Affective Interactions

How often would/do you spend:

1. Talking

Never	**Rarely**	**Sometimes**	**Often**	**Always**
☐	☐	☐	☐	☐

2. Playing

Never	**Rarely**	**Sometimes**	**Often**	**Always**
☐	☐	☐	☐	☐

3. Reading

Never	**Rarely**	**Sometimes**	**Often**	**Always**
☐	☐	☐	☐	☐

4. Soothing/calming/comforting/consoling

Never	**Rarely**	**Sometimes**	**Often**	**Always**
☐	☐	☐	☐	☐

5. Putting to sleep

Never	**Rarely**	**Sometimes**	**Often**	**Always**
☐	☐	☐	☐	☐

Note: Section B and **Section C** are repeated for each form of caregiving capacity

Application for Ethical Approval to Conduct Psychological Research

UNIVERSITY OF CAPE TOWN

Department of Psychology
Research Ethics Committee
Rondebosch, 7701
Tel: 27 21 6503417 Fax: 27 21 6504104

APPLICATION TO CONDUCT PSYCHOLOGICAL RESEARCH

1. All applications must be submitted with the documentation outlined in the attached form.

2. All documents should be submitted electronically.

3. The University of Cape Town's Department of Psychology actively supports research as an essential academic function. It is essential that all applicants consult the UCT Code for Research involving Human Subjects (available from the UCT website).

4. In the case of research involving clinical populations, drug trials, neuroimaging, and recruitment from Groote Schuur Hospital or any affiliated medical institutions, approval must also be obtained from the Faculty of Health Sciences Research Ethics Committee (FHS REC).

5. Final responsibility for the ethical and effective conduct of the research lies with the principal investigator.

HONOURS STUDENTS:

Complete this application form, and submit it to Rosalind Adams with the formal research proposal that forms part of your research methods module in the Honours programme.

MASTER'S AND DOCTORAL STUDENTS:

Complete this application form, and submit it in electronic form to Rosalind Adams attached to the research proposal you will present to a departmental thesis committee.

DEPARTMENTAL STAFF, VISITING SCHOLARS AND POST-DOC STUDENTS:

Complete this application form, and submit it in electronic form to Assoc. Prof. Lauren Wild (lauren.wild@uct.ac.za). The application must be accompanied by a detailed proposal (maximum length 25 1.5-spaced pages).

Section A	Proposal Identification Details	To be completed by all applicants
Section B	Study Information	To be completed for all studies
Section C	Financial and Contractual Information	To be completed by all applicants
Section D	Declaration on Conflict of Interest	To be completed by all applicants
Section E	Ethical and Legal Aspects	To be completed by all applicants
Section F	Checklist	To be completed by all applicants

Section A: Proposal identification details.

1. Title of the proposal/protocol: **Investigating predictors of cradling bias in males**				
2. Has this protocol been submitted to any other Ethical Review Committee?		Yes		No **X**
2.1 If so, list which institutions and any reference numbers.	**N/A**			
2.2 What was/were the outcome/s of these applications?	**N/A**			
3. Is this proposal being submitted for ethical approval for an amendment to a protocol previously approved by this committee?		Yes		No **X**
3.1 If so, what was the previous protocol's reference number? **N/A**				

4. Investigator details

4.1 Principal Investigator (if a student project, the student is the principal investigator):

Title	Initials & Last Name	Department and Institution	Phone	Email	Signature	Date
Mr	**L Herdien**	**UCT Psychology Department**	**076 347 6911**	**lasseherdiensa@gmail.com**	**Lasse Herdien**	**07/05/2018**

4.1.1 (If different to 4.1 above) UCT Principal Investigator

Title	Initials & Last Name	Department and Institution	Phone	Email	Signature	Date
Dr	**L Pileggi**	**UCT Psychology Department**	**021 650 3420**	**plglea001@uct.ac.za**	**Lea-Ann Pileggi**	**07/05/2018**

4.2 Co-investigators: (if a student project, add the supervisor's name here)

Title	Initials & Last Name	Department and Institution	Phone	Email

5. Is the study being undertaken for a higher degree?	Yes **X**		No
If yes: 5.1 What degree? **BSocSc(Hons)**			
5.2 Student name: **Lasse Herdien**			
5.3 Supervisor name: **Lea-Ann Pileggi**			
5.4 In what department is the degree? **Psychology Department**			

Section B: Study Information (summarize the information contained in the proposal).

6. Who will act as participants in the study?

   - **Males aged 18 and older who are not grandparents.**
   - **UCT students (both undergraduate and postgraduate) from across different faculties and acquaintances recruited outside of UCT.**

7. Estimated number of participants: **80**

8. Estimated duration of study: **5 months**

   - **Data collection period: 25 May - 24 August 2018**
   - **Analysis, write-up, submission: 25 August - 1 November 2018**

9. Location of study (e.g. UCT, school, hospital, etc., where you will gather data from the participants):

   - **ACSENT Laboratory (UCT Psychology Department)**
   - **Controlled off-campus settings convenient for non-student participants (e.g., quiet, distraction-free rooms in participants' homes)**

10. Recruitment: Please describe how and from where the participants will be recruited. Attach a copy of any posters or advertisements to be used.

    Participants will be recruited by means of convenience sampling through the UCT Psychology Department's Student Research and Participation Programme (SRPP) and through research invitations issued by the Department of Student Affairs. These invitations will be circulated over Vula and via email. Participants will also be recruited by means of purposive/snowball sampling in which the researchers will identify potential participants from their list of contacts and then through the aid of those participants reach any other individuals who may meet the eligibility criteria for the study.

11. Vulnerable groups: Are there pre-existing vulnerabilities associated with the proposed participants, e.g., relating to pre-existing physiological or health conditions, cognitive or emotional factors, and socio-economic or legal status?

Yes		No **X**

If yes, explain briefly what vulnerability would entail in the study, and how you propose to safeguard participants' wellbeing.

N/A

12. Risks: Briefly describe the research risk associated with your study, i.e. the probability and magnitude of harms participants may experience. Minimal risk means that the probability and magnitude of harm due to participation in the research are no greater than that encountered by participants in their everyday lives.

The study involves minimal risk to participants.

13. Costs: Give a brief description of any costs or economic considerations for participants.

Participants will be required to come into UCT Psychology Department's ACSENT laboratory for their sessions which may involve additional travel costs. In cases where it is unfeasible for non-psychology and non-student participants to travel to the department, the researcher will arrange a controlled and convenient off-campus settings for data collection. All participants will be required to volunteer 45-60 minutes of their time.

14. Benefits: Discuss any potential direct benefits to the participants from their involvement in the project.

SRPP participants will not receive any direct benefits from participating in this study.

All other participants who complete the study fully will be guaranteed automatic entry into a raffle for the chance to win a R1000 cash prize. At the end of the study, one participant will be randomly selected as the winner of the cash prize and will be telephonically of the result.

15. Compensation: If participants are to receive compensation for participation, please provide details.

UCT undergraduate Psychology students will receive 2 SRPP points as for participating in the study. Undergraduate students registered for psychology courses are required to participate in research studies to earn SRPP points. These points are a requirement to be awarded a duly performed certificate (DP) required to write the exam. Students are required to earn a certain number of points for each course.

All other participants who complete the study fully will be guaranteed automatic entry into a raffle for the chance to win a R1000 cash prize. At the end of the study, one participant will be randomly selected as the winner of the cash prize and will be telephonically of the result.

16. Consent. Describe the process to be used to obtain informed consent. Where applicable, attach a copy of the information letter and consent form.

Each participant will be required to read and sign an informed consent form upon arrival at the study before participating in any aspect of the research. The consent form provided will include a clear and detailed description of the study and its procedures and participants will be made aware of their ability to discontinue their voluntary involvement in the research at any point without consequence.

17. Confidentiality. Please describe the procedures to be used to protect confidentiality of the data.

Participants' identities and any additional personal information obtained through the course of the study will not be revealed to anyone other than the principal researcher. The computer and laptop equipment used to store and analyze participants' data will be password protected and physically secured by the researcher.

| 18. Does the protocol comply with UCT's Intellectual Property Rights Policy (including ownership of the raw data)? | Yes
X | | No |

Section C: Financial and contractual information

19. Is the study being sponsored or funded?	Yes		No **X**
If yes: 19.1 Who is the sponsor/funder of the study? **N/A**			
19.2 Are there any restrictions or conditions attached to publication and/or presentation of the study results?	Yes		No **X**
19.3 Does the contract specifically recognize the independence of the researchers involved?	Yes		No **X**
(Note that any such restrictions or conditions contained in funding contracts must be made available to the Committee along with the proposal.)			
20. Will additional costs be incurred by the department?	Yes		No **X**
20.1 If yes, specify these costs: **N/A**			

Section D: Statement on Conflict of Interest

The researcher is expected to declare to the Committee the presence of any potential or existing conflict of interest that may potentially pose a threat to the scientific integrity and ethical conduct of any research in the Department. The committee will decide whether such conflicts are sufficient as to warrant consideration of their impact on the ethical conduct of the study.

Disclosure of conflict of interest does not imply that a study will be deemed unethical, as the mere existence of a conflict of interest does not mean that a study cannot be conducted ethically. However, failure to declare to the Committee a conflict of interest known to the researcher at the outset of the study will be deemed to be unethical conduct.

Researchers are therefore expected to sign **either** one of the two declarations below.

a) As the Principal Researcher in this study (name: Lasse Herdien), I hereby declare that I am **not aware** of any potential conflict of interest which may influence my ethical conduct of this study.

Signature: _____ Date: 07/05/2018

b) As the Principal Researcher in this study (name: _____), I hereby declare that I am **aware** of potential conflicts of interest which should be considered by the Committee:

Signature: _____   Date: _____

Section E: Ethical and legal aspects

21. Have you read the UCT Code for Research involving Human Subjects (available from the UCT website)?	Yes		No
	X		

Section F: Checklist   **Tick**

Application form	1 electronic copy	X
Covering letter and all other correspondence (e.g., ethics approval from other bodies, letters to parents, etc.)	1 electronic copy	X
Detailed proposal, ~~including a 200-word summary/abstract~~	1 electronic copy	X
Consent/Assent form/s	1 electronic copy	X
Participant information sheet/Debriefing form (if separate from consent form)	1 electronic copy	X
Other documents (e.g., advertising posters)	1 electronic copy	X

IMPORTANT NOTES:

- All applicable sections of this application form must be filled in OR justified why not.
- All applicable signatures must be sought
- All additional number of copies must be included with application
- All incomplete applications will be returned to the applicant, leading to delays in review.

Version February 2017