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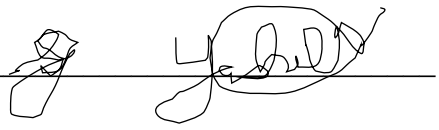
Signature 

The Relationship between Cradling Bias and Attachment and Social Skills in Students

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Abstract

Cradling bias – which is the tendency to cradle an infant to the left side of one's body when soothing it – has been reliably demonstrated and observed within approximately 74% of the female population. This bias is also evident in males, however it has been suggested that it is less prominent in males and becomes more pronounced with parenting or caregiving experience. The prevailing theory is that leftward cradling bias (LCB) reflects an evolutionary left visual field bias and right hemisphere dominance for processing social and emotional information, allowing for the parent/caregiver to more efficiently process the infant's emotional state and respond more effectively to their needs. This in turn would lead to a more secure attachment style. Therefore, it is proposed that LCB is linked to attachment and social skills. This study investigated whether LCB is related to social skills and attachment style, bearing in mind potential predictors such as handedness, gender and a diagnosis of Depression and/or Anxiety. Our sample consisted of 706 undergraduate students aged between 18 and 46, both males and females. Regression analyses showed that neither social skills nor attachment were predictors of LCB. Females and males were found to have almost identical prevalence of LCB, and sex was also not found to be a predictor of LCB. Right-handed individuals were found to have a higher prevalence of LCB, but handedness was not predictive of LCB. A diagnosis of Depression and/or Anxiety were also not correlated to prevalence of LCB, contrary to previous findings.

Keywords: Leftward cradling bias, social skills, attachment, cerebral monitoring hypothesis, cerebral lateralisation

Introduction

Cradling bias - the tendency to cradle an infant towards the left side of one's body when soothing it - has been reliably demonstrated and can be observed in approximately 74% of the female population (Packheiser et al., 2019). This bias is also evident in male samples, although some suggest that it is less prominent in males and becomes more pronounced with parenting experience (Harris et al., 2007). This slightly increased bias in females may be due to them exhibiting higher functional lateralisation of emotional processing in the right hemisphere of the brain (Burton & Levy, 1989).

There is evidence that leftward cradling bias (LCB) is present in young children (Forrester et al., 2019; Pileggi et al., 2013, 2015), indicating it is not learnt but is rather an innate/primitive bias. Furthermore, this phenomenon spans across history and cultures (Hopkins, 2004; Manning & Chamberlain, 1991; Manning et al., 1994; Richards & Finger, 1975; Saling & Cooke, 1984). Notably, non-human primates show the same tendency towards leftward cradling, in a similar proportion to that of the human female population (Paraire, 2017). Altogether, this suggests that innate biological processes are involved, and accumulating evidence suggests that LCB may be linked to secure bonding and attachment between mother and infant (Huggenberger et al., 2009; Malatesta et al., 2019a; Seifer et al., 1996;). It is proposed that LCB in humans reflects an evolutionary bias where left visual field information projects to the right hemisphere, which has dominance for processing social and emotional information (Forrester et al., 2019). There is also evidence that LCB may facilitate the development of typical brain asymmetries in the cradled infant, as measured in adulthood (Hendriks et al., 2011; Vervloed et al., 2011).

Past and Present Theories

A variety of theories have been proposed to explain why LCB comes about. The heartbeat hypothesis explained cradling bias by proposing that when cradling an infant to the left, the mothers heartbeat will be more easily detectable, which is thought to be soothing for the infant (Salk, 1960). A second early hypothesis – the handedness hypothesis – proposed that because people tend to keep their dominant hand free for other tasks, and the majority of people are right-handed (Annett, 1985), this then results in LCB (Huheey, 1977; van der Meer & Husby, 2006). However, a meta-analysis by Packheiser et al. (2019) showed that left-handed people also exhibit a LCB, albeit at a lower rate than right-handed people. Overall, the heartbeat hypothesis lacks empirical evidence (Paraire, 2017) and findings supporting the handedness hypothesis have been contradictory (Packheiser et al., 2019; van der Meer & Husby, 2006).

The current primary theory for LCB takes a more cerebral approach, looking at the role played by the right hemisphere of the brain in processing emotions (Donnot & Vauclair, 2007). Manning and Chamberlain (1991) proposed that due to the infant being held in the left visual and auditory fields of the caregiver, they would be able to better monitor the infant's well-being and more effectively respond to their needs. Information from the left visual field projects more directly to the right hemisphere, which has been shown to play a crucial role in the perception and expression of emotional information (Bourne & Todd, 2004; Bryden & Levy, 1983). Indeed, females who cradled the infant with their face in their left visual field were found to distinguish between emotional and neutral facial expressions in their babies more accurately (Huggenberger et al., 2009). Additionally, the infant is also able to see the more expressive left side of the mother's face (Vauclair & Donnot, 2005). The right hemisphere further regulates the emotional exchanges between the mother and infant (Scola & Vauclair, 2010).

Elaborating on a cerebral monitoring hypothesis, various scholars have suggested that the right hemisphere's specialised role in socio-emotional relatedness may be facilitating LCB (Brancucci et al., 2009; Pileggi et al., 2013, 2015; Schore, 2005). This theory was partially borne from findings linking reduced LCB to autism spectrum disorder and/or high levels of autistic traits (Fleva & Khan, 2015; Herdien et al., 2020; Pileggi et al., 2013, 2015). To elaborate briefly, Pileggi et al. (2013, 2015) found LCB to be absent in samples of children diagnosed with ASDs, while neurotypical and intellectually disabled samples still exhibited the expected LCB. Given that difficulties in social interactions are considered a core component of ASD, in conjunction with their findings and previous literature, they proposed that LCB is facilitated by primitive brain processes involved in relating to others.

In keeping with this, numerous scholars propose a connection between cradling bias and the quality of the caregiver-child relationship, due to the right hemisphere's role in facilitating attachment (Malatesta et al., 2019a; Pileggi et al., 2013; Vauclair & Donnot, 2005). Leftward cradling has been proposed as a facilitator of social bonding and attachment formation, which are processes thought to be made possible by the innate ability to relate (Pileggi et al., 2013).

This lateralisation in humans also occurs in two other types of social touch: hugging and kissing (Malatesta et al., 2019a). Hugging refers to "the act of holding another person closely, while putting one's arms around their neck or back" (Ocklenburg et al., 2018, p. 356). Packheiser et al. (2018) found that a strong rightward bias is present when embracing, but that this bias is reduced when the embrace takes place in an emotional context (both positive and negative). This can be explained using by hemispheric lateralisation, since non-emotional contexts would not require a leftward bias and therefore motor predictors (such as handedness and footedness) would explain this rightward tendency in these situations (Ocklenburg et al., 2018). Kissing

refers to “the act of pressing one’s lips against another person” (Ocklenburg et al., 2018, p. 357). It was also found that people turn their heads to the right when kissing a romantic partner (Barrett et al., 2006; Güntürkün, 2003; Ocklenburg & Güntürkün, 2009; van der Kamp & Canal-Bruland, 2011). However, parents were found to turn their heads to the left when kissing their children, hypothetically for similar reasons as the leftward cradling bias (Sedgewick & Elias, 2016). Ocklenburg et al. (2018) believe that cradling, hugging and kissing all involve emotional lateralisation but are also affected by motor biases such as handedness.

Attachment and cradling bias

In keeping with Pileggi et al.’s (2013) proposed theory, the monitoring hypothesis proposed that keeping the infant in the left visual field promotes better monitoring of the infant’s emotional state (due to directly projecting to the right hemisphere), thereby facilitating a more secure attachment between mother and child (De Carli et al., 2015; Huggenberger et al., 2009). Indeed, Turnbull and Collins (2000) found that rightward cradlers tend to have difficulty bonding with their infants and are less responsive when compared to leftward cradlers. More recently, Malatesta et al. (2019a) found that positive attachment styles to a mother or especially a romantic partner were associated with increased LCB. Consequently, they propose that LCB represents a positive emotional connection between a child and the cradler, and therefore facilitates the bonding process (Jooste, 2018; Malatesta et al., 2020; McGrath, 2013).

Social skills and relating

Recently, researchers have begun to investigate whether heightened social skills may be associated with LCB. Logically, if one struggles to relate to others, it follows that social skills may also be impacted. As hypothesised, Forrester et al. (2019) found LCB to be associated with better social skills. They found that neurotypical children who cradled to the left were more

likely to want to please their teacher, follow the rules, voluntarily share with others, want to play with others rather than alone, engage in eye contact when talking to others, and were able to communicate more easily with familiar adults and other children. An argument can also be made that the reduced LCB associated with high autistic traits is a consequence of deficits in social abilities which characterises ASDs. There has also been some tentative evidence that reduced LCB is associated with decreased empathy (Malatesta et al., 2019b), of which relating is the foundation. However, despite the theoretical basis for these assumptions, there is a marked lack of empirical evidence to support them.

Other theories

Although attachment and social skills are the focal variables of this study, a diagnosis of Depression and/or Anxiety will also be controlled for. Those diagnosed with mood disorders, and in specific, depression and/or anxiety (Fleva & Khan, 2015; Malatesta et al., 2020; Pileggi et al., 2020) are a second sample in which the otherwise universal LCB is disrupted. While findings have been mixed to date (e.g., Reissland et al., 2009; Storey, 2018), there seems to be increasing evidence that depression and/or anxiety disrupt LCB (Fleva & Khan, 2015; Malatesta et al., 2020; Pileggi et al., 2020). Fleva and Khan (2015), for example, noted that soon-to-be mothers with depressive symptoms tended to cradle to the right. Furthermore, Pileggi et al. (2020) found that as depressive symptoms increased, individuals were less likely to cradle to the left. They further proposed that sub-clinical levels of depressive symptoms may not disrupt LCB in the way that clinical levels do. This could possibly explain the mixed findings in this area, as previous studies have generally recruited non-clinical samples or very small clinical samples. This may be linked to the evidence suggesting that LCB is facilitated by the ability to relate, as depressive and anxious symptoms may interfere with relational abilities (Knobloch & Knoblock-Fedders, 2010).

Rationale, Aims and Hypotheses

Despite recent studies being conducted, there is still a scarcity of research on the relationship between LCB and attachment and social skills, and findings have often been mixed (e.g. Herdien et al., 2020; Oppler & Laubscher, 2021). The most widely accepted explanation for LCB is a cerebral monitoring hypothesis, which proposes that placing the infant in the left visual field allows for better monitoring of their emotions due to direct projection to the right hemisphere, which is specialised for the perception of emotional information. This more efficient social-emotional processing has been argued to facilitate a stronger attachment between caregiver and infant. Therefore, seeing as this theory proposes that LCB is driven by innate processes of forming bonds and relating to others, LCB should be associated with higher social skills and more secure attachment. However, there is a lack of empirical evidence to back this up, and only a few studies have tentatively supported this relationship.

Therefore, the current study investigated whether LCB was related to social skills and attachment style in young adults. It did so, bearing in mind other potential covariates, namely gender, handedness, and diagnosis of Depression and/or Anxiety. To elaborate, previous research has established that females present with a more pronounced LCB than males, that right-handed individuals present with a more pronounced LCB, and that a diagnosis of Depression and/or Anxiety is linked to a lower prevalence of LCB.

Hypotheses

We aimed to investigate the following hypotheses:

H1: LCB would be positively associated with higher social skills.

H2: LCB would be associated with more secure attachment styles to romantic partners and mothers.

Methods

Design and setting

The current study utilised a cross-sectional correlational design to examine the relationship between cradling bias and two predictors, namely attachment and social skills. Previously identified potential correlates were also assessed, namely gender, handedness, and diagnosis of Depression and/or Anxiety. The study was conducted online.

Participants

Both male and female UCT psychology students over the age of 18 were included in this study. Participants were recruited by means of convenience sampling through a research invitation sent via the UCT Psychology Department's Student Research Participation Programme (SRPP). A power analysis with a 0.05 significance level, effect size of 0.3, and a desired power level of 0.8 determined that a minimum of 51 participants would be needed to perform a regression analysis. We also aimed to investigate whether gender would emerge as a covariate. We therefore aimed to recruit a minimum of 100 participants (50 males and 50 females minimum). Only those 18 years of age or older were included in this study, with no exclusion criteria for other demographics such as gender. Those who are parents or have significant previous caregiving experience were excluded from this study, given the partial evidence of a possible relationship between parenting experience and LCB (Bourne & Todd, 2004). Significant caregiving experience, whilst not having a set definition, was considered to be based on the frequency and length of time which an individual spent providing primary care to a child (Herdien, 2018; Hermanns & Mastel-Smith, 2012). Those with a previous diagnosis of autism were also excluded from the study.

Ethics

We first obtained ethical clearance from the UCT department of Psychology Ethics Committee (Appendix H). Each participant was required to read and sign an informed consent form that was provided to them during the online survey. This form included a description of the study and its procedures, so that participants had all necessary information to provide informed consent. Participants were also made aware that their involvement was voluntary and that they were free to withdraw from the study at any point without consequence. There were no expected risks for participants in this study. 1 SRPP point was awarded to participants who were involved in the study. All data collected from participants and any additional personal information obtained in this study are accessible only to the principal researchers. Computer equipment used to store and analyse data has been password protected and physically secured. Upon completion of the study, participants were informed of the purpose of the research and provided with the researchers' contact details should they have any questions regarding the study.

Measures

Demographic Questionnaire. The demographic questionnaire was a self-report measure including questions which aimed to (1) collect basic demographic data (e.g., gender, age) and (2) determine eligibility for participation (e.g.parenting experience) (see Appendix A).

Cradling Bias Task. This task is designed to measure cradling bias. Participants were presented with an image that demonstrated the cradling position (Figure 1 below). They were then given the following instruction:

> 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?

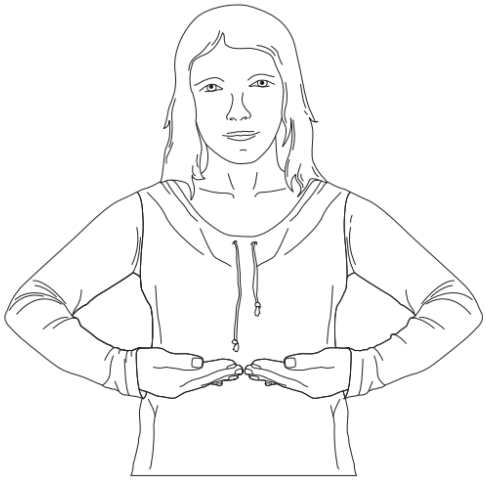

Figure 1 (taken from "Cradling Bias is absent in children with autism spectrum disorders" by Pileggi et al. (2013), *Journal of Child and Adolescent Mental Health*, 25(1), p. 57).

This was done on four separate occasions. Cradling was coded as a categorical variable (i.e., left or not left) for descriptive analysis and as a continuous variable for inferential analyses. To elaborate, for continuous coding, each leftward cradle was coded as a -1 and each rightward cradle as a +1. A score of -4 would therefore indicate a strong leftward bias, a score of 0 would indicate no bias, and a score of +4 would indicate a strong rightward bias. Rightward cradling and no bias were grouped together as "not-left". Therefore, any score 0 or higher was classified as not-left, and any score lower than 0 was classified as left.

Relationships Structure (ECR-RS) Questionnaire. The ECR-RS is a self-report questionnaire used to measure attachment styles in adults (Fraley et al., 2011; Appendix B). This questionnaire is comprised of 36 items covering 4 domains, namely relationship with one's mother, father, romantic partners, and friends (9 items per domain). Responses are on a 7-point

Likert scale, from Strongly Disagree (a score of 1) to Strongly Agree (a score of 7). Two scores were computed, one for attachment-related avoidance and the other for attachment-related anxiety. Lower scores on this questionnaire can be interpreted as secure attachment. These two separate scores were used in the regression analysis, and a total of both scores was used for descriptive statistics. Internationally, the ECR-RS has also been found to have high validity (da Rocha et al., 2017), and is a psychometrically sound measure of attachment anxiety and avoidance in all four of the domains it covers (Fraley et al., 2011). The psychometric soundness in South African samples, however, is unknown.

Interpersonal competence questionnaire (ICQ). The ICQ is a 40 item self-report questionnaire designed to measure interpersonal competence in 5 areas: initiation, negative assertion, disclosure, emotional support, and conflict management (Giromini et al., 2016; Appendix C). It makes use of a 5-point Likert scale with a score for each of the 5 domains listed above, where a higher score indicates a higher interpersonal competence. These areas provide a comprehensive overview of relevant interpersonal domains (Buhrmester et al., 1988). The scores in these 5 domains were totalled to obtain a composite score that was used for data analysis. The ICQ was also found to have sufficient validity and reliability internationally (e.g., Giromini et al., 2016). The psychometric soundness in South African samples, however, is unknown.

Edinburgh handedness inventory (EHI) short form. The EHI is a 4 question self-report questionnaire used to measure handedness (the preference to use one hand over the other) (Veale, 2014; Appendix D). These questions asked participants which hand they use for daily tasks, namely: writing, throwing an object, brushing their teeth, and using a spoon. Response options were “Always right”, “Usually right”, “Both equally”, “Usually left” and “Always left”. These responses were also coded as values, specifically +100, +50, 0, -50 and -100 for each of

the options above respectively. The values were summed and divided by four to get a value called the Laterality Quotient (LQ) (Veale, 2014). If the LQ was lower than -60, a participant was classified as left-handed, if the LQ was between -60 and +60 then they were classified as ambidextrous, and if the LQ was higher than 60 then they were classified as right-handed. This shorter version of the original questionnaire was found to have superior psychometric performance compared to the 7 and 10 item models (Cicchetti, 1994; Veale, 2014).

Depression and Anxiety. Depression and Anxiety were measured using a self-report questionnaire asking participants whether they have a current diagnosis of Depression and/or Anxiety.

Procedure

A survey created with Survey Monkey was advertised to participants through the UCT SRPP, with research invitations sent via email to all undergraduate psychology students (Appendix F). Students clicked on the link to complete the survey online. On beginning the survey, participants were presented with more information on the study as well as an informed consent form (Appendix G). Once informed consent was given, participants completed all questionnaires/tasks in the following order: demographics questionnaire, CB (Cradling Bias trial) 1, ECR-RS, CB trial 2, ICQ, CB trial 3, CB trial 4, and EHI. As seen, the four cradling bias trials were completed in between each of the questionnaires. Participants were then thanked for their participation, and informed that they could contact the primary researchers should they have any further questions regarding this study. This study took approximately 30-40 minutes to complete.

Data Analysis

All statistical analyses were conducted using R Studio Version 1.4.1106, using the conventional significance level of alpha (α) = 0.05. Descriptive statistics were used to display the

demographic and other sample characteristics. Cradling bias was treated as a categorical variable (either Left, No Bias, or Right) for descriptive analysis, and as a continuous variable for inferential analysis. Hierarchical regression analysis was conducted to investigate whether attachment and social skills are significant predictors of cradling bias, while taking into account potential other predictors namely Handedness, Gender, a diagnosis of Depression and/or Anxiety disorder. Informed by previous literature, predictors follow the following sequence: Handedness, Gender, Depression and/or Anxiety disorder diagnosis, Social Skills, Attachment. The two variables of most interest in this study were placed last in sequence to investigate whether they have an effect over and above the other variables included. Assumptions for multiple linear regression were also tested. Data distribution of variables was normal except for avoidance (which required a log transformation) and anxiety, which was skewed to the right. Depression and Anxiety were found to be correlated with one another ($r = 0.62$) and avoidance and anxiety were also correlated ($r = 0.53$), however this was to be expected. Residual checks were also done and deemed appropriate for analysis. All assumption checks are included in Appendix I, and descriptive statistics can be found in Appendix J.

Results

Descriptive statistics

Our sample consisted of 706 participants with ages ranging from 18 to 46 ($M = 20.04$, $SD = 2.38$). A total of 582 participants identified as female, 115 identified as male, and 9 did not wish to identify as either. 62.37% of females and 63.48% of males showed a leftward cradling bias. A chi-squared test showed that sex and cradling bias were associated ($\chi2 = 11.58$, $p = 0.02$). Cramer's V was found to be 0.09, indicating a weak association between sex and cradling bias. 93.48% were right-handed, 6.23% were left-handed and 0.28% were ambidextrous. As only 2

participants were found to be ambidextrous, they were excluded from further analysis. This distribution of handedness was also consistent across gender, with 93.64% of females and 93.04% of males being right-handed versus 6.01% of females and 6.96% of males being left-handed. 63.48% of right-handed participants cradled to the left, whereas only 43.18% of left-handed participants cradled to the left. A chi-squared analysis conducted between handedness and cradling bias also showed a significant association ($\chi 2 = 10.27$, $p = 0.03$). However, Cramer's V was 0.17, indicating a weak association.

99.43% of participants had never been diagnosed with autism, with only 4 reporting a previous diagnosis. Due to this low number, a diagnosis of autism was removed as a predictor for the analysis. 15.72% of participants reported that they had been previously diagnosed with depression, and 20.82% were previously diagnosed with anxiety. In those with and without an anxiety diagnosis, the prevalence of LCB was 57.82% and 63.51% respectively. In those with and without a depression diagnosis, the prevalence of LCB was 61.26% and 62.52% respectively. Chi-squared tests for both Depression and Anxiety also showed insignificant results ($\chi 2 = 0.49$ and $p = 0.78$ for Depression, and $\chi 2 = 1.64$ and $p = 0.44$ for Anxiety). Cramer's V for Depression and Anxiety was 0.03 and 0.05, further showing no association. Therefore, a diagnosis of Depression or Anxiety does not seem to be associated with a change in prevalence of LCB.

Avoidance and anxiety in relationships (measurements of attachment quality) was extremely similar among both leftward and non-leftward cradlers ($M = 4.61$ and $M = 4.71$ respectively). Across sex, avoidance and anxiety were also almost identical ($M = 4.63$ for females and $M = 4.64$ for males). Cramer's V for avoidance and anxiety was 0.2 and 0.15 respectively, showing a very weak relationship between these variables and cradling bias, Social

skills were also similar regardless of cradling bias (M = 40.36 for leftward cradlers and M = 40.62 for non-leftward cradlers). Cramer's V was 0.26, also showing a weak relationship between social skills and cradling bias.

Regression model

Two separate hierarchical regression models were used for attachment and social skills separately, as these were our main predictors of cradling bias. The first model used a five-stage approach with LCB as the dependent variable. At the first stage, handedness was added, due to previous literature revealing a correlation between handedness and cradling bias, with a prevalence of LCB found among those who are right-handed. Sex was added at the second stage, as differences have been found between males and females, with males not consistently displaying LCB. In the third and fourth stages, a Depression diagnosis and an Anxiety diagnosis were added respectively, as previous studies have found that Depression and/or Anxiety can disrupt LCB. In the fifth stage, the attachment variables (avoidance and anxiety) were added. In the second model, a five-stage approach with LCB as the dependent variable was also used, with a similar order to the first model. In the first stage, handedness. In the second stage, sex was added into the model. A diagnosis of Depression was added at the third stage, and a diagnosis of Anxiety was added at the fourth stage. Finally, social skills was added in the fifth stage.

	Cradling Bias	Sex	Handedness	Depression	Anxiety	Avoidance	Anxiety
Cradling Bias							
Sex	-0.01						
Handedness	-0.11**	0.00					
Depression	0.03	0.07	-0.03				
Anxiety	0.05	0.12**	-0.03	0.62****			
Avoidance	-0.02	-0.01	-0.03	0.08*	0.07		
Anxiety	0.05	0.01	-0.02	0.19****	0.12**	0.53****	
Social Skills	0.01	0.03	0.00	0.02	0.02	-0.31****	-.018****

Table with intercorrelations between variables

The results revealed that at stage one of the first model, handedness accounted for 1% of variation in LCB. However, adding sex at stage 2 was not significant, change in $F(2, 702) = 0.06$. A Depression diagnosis did not contribute to the model, change in $F(3, 701) = 0.62$. An Anxiety diagnosis was also found to not be significant, change in $F(4, 700) = 0.96$. In the fifth and final stage, adding the variables of interest (avoidance and anxiety) did not explain any further variation in cradling bias, change in $F(5, 698) = 1.72$. See below tables for detailed statistics at each stage of Model 1.

Model 1 using Attachment

	Dependent variable:				
	Cradling Bias				
	(1)	(2)	(3)	(4)	(5)
Handedness	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Sex		0.113	0.131	0.162	0.171
		(0.323)	(0.324)	(0.325)	(0.325)
Sex		-0.001	-0.044	-0.082	-0.148
		(1.063)	(1.065)	(1.065)	(1.066)
Depression Diagnosis			0.259	0.007	-0.088
			(0.329)	(0.418)	(0.423)
Anxiety Diagnosis				0.369	0.389
				(0.377)	(0.377)
Anxiety					0.202*
					(0.117)
Avoidance					-0.156
					(0.105)
Constant	-0.720***	-0.739***	-0.787***	-0.832***	-0.758**
	(0.245)	(0.252)	(0.259)	(0.263)	(0.366)
Observations	706	706	706	706	706
R^2	0.012	0.012	0.013	0.014	0.019
Adjusted R^2	0.011	0.008	0.007	0.007	0.009
Change in R^2	0.012	0	0.001	0.001	0.005
Residual Std. Error	3.160 (df = 704)	3.164 (df = 702)	3.165 (df = 701)	3.165 (df = 700)	3.162 (df = 698)
F Statistic	8.591*** (df = 1; 704)	2.897** (df = 3; 702)	2.327* (df = 4; 701)	2.053* (df = 5; 700)	1.960* (df = 7; 698)
Note:					*p<0.1; **p<0.05; ***p<0.01

Cradling Bias

Predictors	*Estimates*	*std. Error*	*std. Beta*	*standardized std. Error*	*CI*	*standardized CI*	*Statistic*	*p*
(Intercept)	-0.76	0.37	-0.03	0.05	-1.48 – -0.04	-0.12 – 0.06	-2.07	**0.039**
Handedness	-0.00	0.00	-0.11	0.04	-0.00 – -0.00	-0.18 – -0.04	-2.90	**0.004**
Sex [Male]	0.17	0.33	0.05	0.10	-0.47 – 0.81	-0.15 – 0.25	0.53	0.599
Sex [Prefer not to answer]	-0.15	1.07	-0.05	0.34	-2.24 – 1.94	-0.71 – 0.61	-0.14	0.889
Depression Diagnosis [Yes]	-0.09	0.42	-0.03	0.13	-0.92 – 0.74	-0.29 – 0.23	-0.21	0.836
Anxiety Diagnosis [Yes]	0.39	0.38	0.12	0.12	-0.35 – 1.13	-0.11 – 0.35	1.03	0.303
Anxiety	0.20	0.12	0.08	0.04	-0.03 – 0.43	-0.01 – 0.17	1.72	0.085
Avoidance	-0.16	0.11	-0.07	0.04	-0.36 – 0.05	-0.15 – 0.02	-1.48	0.140
Observations	706							
R^2 / R^2 adjusted	0.019 / 0.009							

For the second model, handedness at stage 1 accounted for approximately 1% of variance in LCB. At the second stage, adding sex was not significant, change in F(2, 702) = 0.06. In the third stage, a diagnosis of Depression also did not contribute to the model, change in F(3, 701) = 0.62. Adding diagnosis of Anxiety in stage four was not significant to the model either, change in F(4, 700) = 0.96. In the final stage, adding social skills was not found to be a predictor of cradling bias and did not contribute to the model either, change in F(5, 699) = 0.02. See below tables for detailed statistics at each stage of Model 2.

Model 2 using Social Skills

	Dependent variable:				
	Cradling Bias				
	(1)	(2)	(3)	(4)	(5)
Handedness	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Sex		0.113	0.131	0.162	0.163
		(0.323)	(0.324)	(0.325)	(0.326)
Sex		-0.001	-0.044	-0.082	-0.090
		(1.063)	(1.065)	(1.065)	(1.067)
Depression Diagnosis			0.259	0.007	0.006
			(0.329)	(0.418)	(0.418)
Anxiety Diagnosis				0.369	0.368
				(0.377)	(0.377)
Social Skills					0.002
					(0.016)
Constant	-0.720***	-0.739***	-0.787***	-0.832***	-0.929
	(0.245)	(0.252)	(0.259)	(0.263)	(0.686)
Observations	706	706	706	706	706
R^2	0.012	0.012	0.013	0.014	0.014
Adjusted R^2	0.011	0.008	0.007	0.007	0.006
Change in R^2	0.012	0	0.001	0.001	0
Residual Std. Error	3.160 (df = 704)	3.164 (df = 702)	3.165 (df = 701)	3.165 (df = 700)	3.168 (df = 699)
F Statistic	8.591*** (df = 1; 704)	2.897** (df = 3; 702)	2.327* (df = 4; 701)	2.053* (df = 5; 700)	1.712 (df = 6; 699)

Note: *p<0.1; **p<0.05; ***p<0.01

Cradling Bias								
Predictors	*Estimates*	*std. Error*	*std. Beta*	*standardized std. Error*	*CI*	*standardized CI*	*Statistic*	*p*
(Intercept)	-0.93	0.69	-0.03	0.05	-2.27 – 0.42	-0.12 – 0.06	-1.35	0.176
Handedness	-0.00	0.00	-0.11	0.04	-0.00 – -0.00	-0.18 – -0.03	-2.88	**0.004**
sex [Male]	0.16	0.33	0.05	0.10	-0.48 – 0.80	-0.15 – 0.25	0.50	0.617
sex [Prefer not to answer]	-0.09	1.07	-0.03	0.34	-2.19 – 2.01	-0.69 – 0.63	-0.08	0.933
Depression Diagnosis [Yes]	0.01	0.42	0.00	0.13	-0.81 – 0.83	-0.26 – 0.26	0.02	0.988
Anxiety Diagnosis [Yes]	0.37	0.38	0.12	0.12	-0.37 – 1.11	-0.12 – 0.35	0.98	0.329
Social Skills	0.00	0.02	0.01	0.04	-0.03 – 0.03	-0.07 – 0.08	0.15	0.879
Observations	706							
R^2 / R^2 adjusted	0.014 / 0.006							

Overall, handedness was found to be the only significant predictor of cradling bias in both models ($p < 0.01$). However, even handedness only accounted for 1% of variation in cradling bias. Our main hypotheses were that LCB would be positively associated with higher social skills and with more secure attachment styles. However, the regression analysis for both models indicated very low predictive ability. For the first model, $F(7, 698) = 1.96$, R-squared = 0.01, $p = 0.06$ and for the second model, $F(6, 699) = 1.71$, R-squared = 0.01, $p = 0.12$. These low R-squared value indicates that the first model using attachment explains 1% of the variance in cradling bias, while the second model using social skills also explains only 1% of variance.

Discussion

Contrary to predictions, our study found no association between cradling bias and social skills, nor between cradling bias and attachment. This goes against the cerebral hypothesis, which proposes that LCB is designed to improve socio-emotional processing by allowing a

caregiver to more effectively process an infant's emotional states by relaying information from their facial expressions in the left visual field directly to the right hemisphere (Bourne & Todd, 2004; Bryden & Levy, 1983; Huggenberger et al., 2009; Manning & Chamberlain, 1991).

Cradling and attachment

The regression model indicated that attachment played no role in predicting LCB. This could be expected given that no zero-order correlation was apparent between these two variables. Although findings positively correlating LCB with a secure attachment are limited (Malatesta et al., 2019a), the cerebral monitoring theory proposed that the more efficient processing of the emotional face of an infant that leftward cradling allows would lead to a more secure bond (De Carli et al., 2015; Huggenberger et al., 2009). Therefore, we expected to find LCB positively associated with a more secure attachment style. However, this was not the case. A possible reason for this is the fact that attachments are not necessarily set in stone, and can be changed through meaningful events or relationships – for example, trauma can lead to a shift to a more insecure attachment (Wallin, 2007), whereas marriage can transform an insecure attachment into a secure attachment (Crowell et al., 2002; Hesse, 1999). These results could also indicate that the measurement scale used - the ECR-RS - may not be a reliable indicator of attachment style. Herdien (2018) also found in their study that the avoidance and anxiety scales did not predict LCB, and proposes that measures like the ECR-RS may only identify the way in which social attachments are formed through LCB and not necessarily the quality of the bond itself that results from it.

Cradling and social skills

Contrary to previous research, cradling bias was not significantly associated with social skills. This was in keeping with the lack of a zero-order correlation found between the two

variables. Additionally, in the regression model, social skills had no predictive value above and beyond other predictors. It was hypothesised that LCB would be positively associated with higher social skills, due to the proposal that LCB is facilitated by innate processes involved in relating to others (Forrester et al., 2019; Pileggi et al., 2013, 2015). Again, the validity issues of self-report measures and social desirability bias may help to explain these non-significant findings.

Other predictors

Although the central focus of this study was the relationship between cradling bias and social skills and attachment, handedness, gender and a diagnosis of Anxiety and/or Depression were also used as secondary predictors. Handedness was not found to predict cradling bias. Right-handed individuals exhibited a higher prevalence of LCB than left-handed individuals, which mirrors the results of a meta-analysis by Packheiser et al. (2019). However, handedness only accounted for approximately 1% of variation in cradling bias, implying that other factors are responsible for LCB. Additionally, no zero-order correlation was found between the two variables. These findings therefore do not support the handedness theory, i.e., that right-handed people will cradle to the left to free up their dominant hand for other tasks (Huheey, 1977). However, other studies have found that left-handed and right-handed individuals display LCB in similar rates (Donnot & Vauclair, 2007; Scola & Vauclair, 2010). Therefore, these findings further add to inconsistencies in findings from previous studies.

Our study found that gender did not have any predictive value for cradling bias, and no zero-order correlation was found between the two variables. Indeed, very similar rates of cradling bias were found between males and females, at 62.37% and 63.48% respectively. Previous studies have consistently found a LCB rate of approximately 74% in the human female

population (Packheiser et al., 2019). The slightly higher prevalence of LCB among males (63.48%) was unexpected, as some previous studies have found a lower rate of LCB among males (Harris et al., 2007). Some have also proposed that females have higher functional lateralisation of emotional processing in the right hemisphere of the brain (Burton & Levy, 1989), and therefore a higher prevalence of LCB would be expected in females. These findings could indicate that cradling bias is a universal phenomenon and is not exclusively a female tendency, as some studies have suggested.

Contrary to previous findings, a diagnosis of Depression and/or Anxiety was not predictive of LCB. There were also no zero-order correlations found between either Depression or Anxiety and cradling bias. These findings also add to an uncertain knowledge base, with some studies finding that Depression and/or Anxiety disrupt LCB (Fleva & Khan, 2015; Malatesta et al., 2020; Pileggi et al., 2020) but others finding no relation (Reissland et al., 2009; Storey, 2018). A potential reason for these findings was that participants were only asked to state whether they have a current diagnosis of Depression and/or Anxiety, and not whether they have ever been diagnosed with either. These findings could also be partly due to the issues surrounding the validity of self-report measures, rather than a diagnosis being confirmed by a psychiatric interview.

Limitations and Directions for Future Research

Although our sample had a relatively large number of participants compared to past studies, they were drawn solely from undergraduate university psychology students of approximately 20 years of age. The sample was also predominantly female (82.24%) and

therefore males were not equally represented. Therefore, findings from this study may not be generalisable to the general population.

In addition, self-report measures (which this study made use of) generally have questionable validity due to their subjective natures and reliance on the participants' interpretation and truthfulness when answering the questions (Haeffel & Howard, 2010). Social desirability bias, whereby participants may answer questions in a way that they deem favourable rather than providing entirely truthful answers, may also contribute to these non-significant findings (van de Mortel, 2008). Due to the COVID-19 pandemic, these electronic self-report measures were the only viable forms of data collection, and in-person measures (such as the researchers observing the participant holding the doll) may be more accurate when they become more feasible. As mentioned above, there is also the issue of whether the ECR-RS and ICQ scales used are accurate measures of attachment and social skills respectively.

Language barriers may also have played a part, given that the online surveys used were exclusively in English and it is possible that participants who do not speak English as their first language may have had trouble understanding the questions (and may have been hesitant to email the researchers for help given that these surveys were completed electronically). In future, it can be recommended that researchers be fluent in multiple languages or offer multiple versions of surveys in different languages. It is also recommended that future research attempt to obtain a more representative sample in order to generalise findings to a larger population, such as a more equal gender spread and more varied ages of participants. Given the slightly higher prevalence of LCB found in males compared to females, it is also recommended that further studies be conducted focusing on larger male samples. Additionally, clinical interviews assessing adult attachment and direct observation of social skills would be better measures of attachment and

social skills respectively rather than self-report measures. A longitudinal study of mothers cradling their infants, with an attachment assessment at 18 months to two years of age and a follow-up of social skills at an early school age (to best show relationships of interest) would also be recommended in further studies. The imaginary cradling task is also ideally meant to be conducted in a setting where the researcher can observe, rather than as part of an online survey.

Summary and conclusions

Although the cerebral hypothesis proposed that LCB would be linked to higher social skills and more secure attachment, this was not found to be the case in our sample. Going against our hypotheses, neither social skills nor attachment were found to be significant predictors of LCB. This study found that LCB in males was slightly higher than in females, adding to a very limited number of studies that have found a similar prevalence of this phenomenon in males. LCB was also found to be linked to handedness (specifically being right-handed) which was expected given findings from previous research, but only accounted for around 1% of the variation in cradling bias and was therefore not a significant predictor. Depression and Anxiety were not found to be significant predictors of LCB, which was unexpected given previous findings. Several limitations were identified in our study, such as the demographics of our sample size and the measurement scales used. Therefore, future studies are recommended which make use of a more diverse population and possible different measurements of attachment and social skills.

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Appendix A

Demographics Questionnaire

Name:

Surname:

Student number:

Age:

Sex:

Male	Female	Other (please specify)

Do you have children?

Yes	No

Do you have significant caregiving experience?

Yes	No

If yes, please elaborate on the kind of caregiving experience (e.g., au pair, look after siblings):

_____

_____

____

Have you ever been diagnosed with a clinical condition? (eg. Depression, Anxiety, Autism Spectrum Disorder)

Yes	No

Appendix B

Questionnaire 1

The statements below are about how you feel in emotionally intimate relationships. You can use them to assess how you tend to feel in close relationships generally, or to focus on a particular relationship or typeof relationship. Using the 1 to 7 scale below, after each statement write a number to indicate how much you agree or disagree with the statement when applied to the relationship(s) you are looking at.

1	2	3	4	5	6	7
strongly disagree						strongly agree

		Mother	Father	Partner (current or former)	Friend	Therapist
1	It helps to turn to this person in times of need.					
2	I usually discuss my problems and concerns with this person.					
3	I talk things over with this person.					
4	I find it easy to depend on this person.					
5	I don't feel comfortable opening up to this person.					
6	I prefer not to show this person how I feel deep down.					
7	I often worry that this person doesn't really care for me.					
8	I'm afraid that this person may abandon me.					
9	I worry that this person won't care about me as much as I careabout him or her.					

Appendix C

Questionnaire 2

Instructions

Please read the following statements and indicate how confident you feel in your abilities to completethe described action by choosing one of the five choices below each question. Please indicate your choice in the allocated space.

Answer categories

1 . . . . . .2 . . . . 3 . . . . . 4. 5

I'm always poor at this I'm only fair at this I'm OK at this I'm always good at this I'm extremely good at this

1. Asking or suggesting to someone new that you get together and do something, e.g., go out together	
2. Finding and suggesting things to do with new people whom, you find interesting and attractive.	
3. Carrying on conversations with someone new whom you think you might like to get to know	
4. Being an interesting and enjoyable person to be with when first getting to know people.	
5. Introducing yourself to someone you might like to get to know/date.	
6. Calling (on the phone) a new date/acquaintance to setup a time to get together and do something.	
7. Presenting good first impressions to people you might like to become friends with (or date)	
8. Going to parties or gatherings where you don't know people well in order to start up new relationships	
9. Telling a companion you don't like a certain way he or she has been treating you.	
10. Saying "no" when a date/acquaintance asks you to do something you don't want to do	
11. Turning down a request by a companion that is unreasonable	
12. Standing up for your rights when a companion is neglecting you or being inconsiderate.	
13. Telling a date/acquaintance that he or she is doing something that embarrasses you.	
14. Confronting your close companion when he/she has broken a promise.	
15. Telling a companion that he/she has done something to hurt your feelings.	

16. Telling a date/acquaintance that he/she has done something that made you angry.	
17. Helping a close companion work through his or her thoughts and feelings about a major life decision, e.g., a career choice.	
18. Being able to patiently and sensitively listen to a companion “let off steam” about outside problems s/he is having.	
19. Helping a close companion get to the heart of the problem he/she is experiencing.	
20. Helping a close companion cope with family or roommate problems.	
21. Being a good and sensitive listener for a companion who is upset.	
22. Being able to say and do things to support a close companion when she/he is feeling down.	
23. Being able to show genuine empathetic concern even when a companion’s problem is uninteresting to you	
24. When a close companion needs help and support, being able to give advice in ways that are wellreceived.	
25. Revealing something intimate about yourself while talking with someone you’re just getting to know.	
26. Confiding in a new friend/date and letting him/her see your softer, more sensitive side.	
27. Telling a close companion things about yourself that you’re ashamed of.	
28. Letting a new companion get to know the “real” you.	
29. Letting down your productive “outer shell” and trusting a close companion.	
30. Telling a close companion about the things that secretly make you feel anxious or afraid.	
31. Telling a close companion how much you appreciate and care for him or her.	

32. Knowing how to move a conversation with a date/acquaintance beyond superficial talk to really get to know each other.	
33. Being able to admit that you might be wrong when a disagreement with a close companion begins tobuild into a serious fight.	
34. Being able to put begrudging (resentful) feelings aside when having a fight with a close companion.	
35. When having a conflict with a close companion, really listening to his or her complaints and not trying to “read” his/her mind.	
36. Being able to take a companion’s perspective in a fight and really understand his or her point of view.	
37. Refraining from saying things that might cause a disagreement to build into a big fight.	
38. Being able to work through a specific problem with a companion without resorting to global accusations (“you always do that”).	
39. When angry with a companion, being able to accept that s/he has a valid point of view even if you don’t agree with that view.	
40. Not exploding at a close companion (even when it’s justified) in order to avoid a damaging conflict	

Appendix D

Questionnaire 3

Below is a list of statements. Please read each statement very carefully and rate how strongly you agree or disagree with it by checking off your answer in the relevant box.

	Definitely agree	Slightly agree	Slightly disagree	Definitely disagree
1. I prefer to do things with others rather than on my own.				
2. I prefer to do things the same way over and over again.				
3. If I try to imagine something, I find it very easy to create a picture in my mind.				
4. I frequently get so strongly absorbed in one thing that I lose sight of other things.				

5. I often notice small sounds when others do not.				
6. I usually notice car number plates or similar strings of information.				
7. Other people frequently tell me that what I've said is impolite, even though I think it is polite.				
8. When I'm reading a story, I can easily imagine what the characters might look like.				
9. I am fascinated by dates.				
10. In a social group, I can easily keep track of several different people's conversations.				
11. I find social situations easy.				
12. I tend to notice details that others do not.				
13. I would rather go to a library than a party.				
14. I find making up stories easy.				

15. I find myself drawn more strongly to people than to things.				
16. I tend to have very strong interests which I get upset about if I can't pursue.				
17. I enjoy social chit-chat.				
18. When I talk, it isn't always easy for others to get a word in edgeways.				
19. I am fascinated by numbers.				
20. When I'm reading a story, I find it difficult to work out the characters' intentions.				
21. I don't particularly enjoy reading fiction.				
22. I find it hard to make new friends.				
23. I notice patterns in things all the time.				

24. I would rather go to the theatre than a museum.				
25. It does not upset me if my daily routine is disturbed.				
26. I frequently find that I don't know how to keep a conversation going.				
27. I find it easy to "read between the lines" when someone is talking to me.				
28. I usually concentrate more on the whole picture, rather than the small details.				
29. I am not very good at remembering phone numbers.				
30. I don't usually notice small changes in a situation, or a person's appearance.				
31. I know how to tell if someone listening tome is getting bored.				
32. I find it easy to do more than one thing at once.				

33. When I talk on the phone, I'm not sure when it's my turn to speak.				
34. I enjoy doing things spontaneously.				
35. I am often the last to understand the point of a joke.				
36. I find it easy to work out what someone is thinking or feeling just by looking at their face.				
37. If there is an interruption, I can switch back to what I was doing very quickly.				
38. I am good at social chit-chat.				
39. People often tell me that I keep going on and on about the same thing.				
40. When I was young, I used to enjoy playing games involving pretending with other children.				

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.).				
42. I find it difficult to imagine what it would be like to be someone else.				
43. I like to plan any activities I participate in carefully.				
44. I enjoy social occasions.				
45. I find it difficult to work out people's intentions.				
46. New situations make me anxious.				
47. I enjoy meeting new people.				
48. I am a good diplomat.				
49. I am not very good at remembering people's date of birth.				

50. I find it very easy to play games with children that involve pretending.				

Appendix E

Questionnaire 4

Please indicate your preferences in the use of hands in the following activities or objects by checking off the appropriate box:

	Always right	Usually right	Both equally	Usually left	Always left
Writing					
Throwing					
Toothbrush					
Spoon					

Appendix F

SRPP Advertisement

Looking for Undergraduate Psychology Students to Participate in Research Study (1 SRPP Point)

Dear students,

You are invited to participate in a research study investigating how we relate to each other. If you choose to participate in this study, you will be required to complete a series of online questionnaires/tasks. This should take a total of 45 to complete and you will receive 1 SRPP point for your participation. If you wish to participate in the study, click on the link below: [insert link here]

Please note that all participants' identities and personal data will not be disclosed to anyone other than the principal researchers. In addition, the devices used to store and work on the data collected from participants will be physically secured and password protected.

Please note the following eligibility criteria:

- Minimum of 18 years of age

Please contact Sarah Galvin (GLVSAR002@myuct.ac.za) or Yashil Naidoo (NDXYAS016@myuct.ac.za) for any questions regarding participation in the study.

Appendix G

Consent to participate in a research study

Dear Student,

Study Purpose

You are being asked to participate in a research study being conducted by Honours in Psychology researchers from the University of Cape Town. The purpose of this study is to investigate social skills and attachment styles in students.

Study Procedures

If you decide to participate in this study, you will be required to complete 4 questionnaires online and 4 short tasks online, which will take approximately 30-40 minutes to complete. These questionnaires will involve questions about your relationships with others, attachments with others, interpersonal abilities, and personal habits.

Possible Risks

Participating in this study will not be expected to involve any risks to you.

Possible Benefits

You will receive 1 SRPP point upon completion of all tasks and questionnaires.

Confidentiality

Information about you obtained from this study will be kept confidential, and your name and other identifying information will be kept separate from the questionnaire and task data. This information will be kept in a password protected computer that is physically secured and only accessible to the primary researchers in this study.

Questions

Any study-related questions or issues can be directed to the primary researchers:

Principal Researcher
Sarah Galvin
Department of Psychology
University of Cape Town

Principal Researcher
Yashil Naidoo
Department of Psychology
University of Cape Town

GLVSAR002@myuct.ac.za

NDXYAS016@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

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

_____ _____

Signature of participant Date

_____

Name of participant (Printed)

Appendix H

UNIVERSITY OF CAPE TOWN

Department of Psychology

Research Ethics Committee

Rondebosch, 7701

Tel: 27 21 6503414 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 Prof. Johann Louw (johann.louw@uct.ac.za). The application must be accompanied by a detailed proposal (maximum length 25 1.5-spaced pages).

UNIVERSITY OF CAPE TOWN

DEPARTMENT OF PSYCHOLOGY

APPLICATION FOR ETHICAL APPROVAL TO CONDUCT PSYCHOLOGICAL RESEARCH

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:

The Relationship between Cradling Bias and Attachment and Social Skills in Students

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.	
2.2 What was/were the outcome/s of these applications?	

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?			

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
Ms	S Galvin	Psychology Department University of Cape Town	082 895 8421	GLVSAR002 @myuct.ac. za		12/06 /2021
Mr	YK Naidoo	Psychology Department University of Cape Town	072 969 8929	NDXYAS016 @myuct.ac. za		12/06 /2021

4.1.1 (If different to 4.1 above) UCT Principal Investigator

Title	Initials & Last Name	Department and Institution	Phone	Email	Signature	Date

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

Title	Initials & Last Name	Department and Institution	Phone	Email
	Lea-Ann Pileggi	Department of Psychology University of Cape Town	02165034 20	Lea-ann.pileggi @uct.ac.za

5. Is the study being undertaken for a higher degree?	Yes **X**		No
If yes: 5.1 What degree? BSocSci in Psychology			
5.2 Student name: Sarah Galvin and Yashil Naidoo			
5.3 Supervisor name: Lea-Ann Pileggi			
5.4 In what department is the degree? Department of Psychology			

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

6. Who will act as participants in the study?

   Undergraduate UCT psychology students

7. Estimated number of participants:

   100 minimum (50 females minimum and 50 males minimum)

8. Estimated duration of study:

   5 months

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

   Online

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 through convenience sampling using the UCT Psychology Department's Student Research and Participation Programme (SRPP).

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.

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.

This study would involve a minimal risk to participants.

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

There would be no costs for participants to be involved in this study.

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

Participants will receive 2 SRPP points for their involvement.

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

No compensation will be provided to participants.

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 that will be provided to them during the online survey. This form will include a description of the study and its procedures and participants will be made aware that they are free to leave the study 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 in this study would be accessible only to the principal researchers. Computer equipment used to store and analyse data will be password protected and physically secured.

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?			
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:

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:_____), 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: 12/06/2021

Signature: Date: 12/06/2021

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

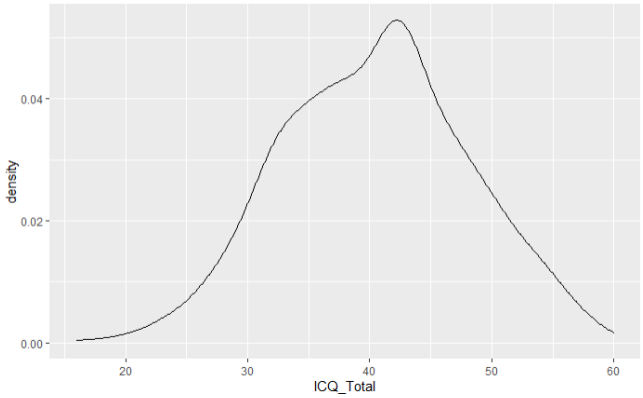
21. Have you read the UCT Code for Research involving Human Subjects (available from the UCT website)?	Yes **X**		No

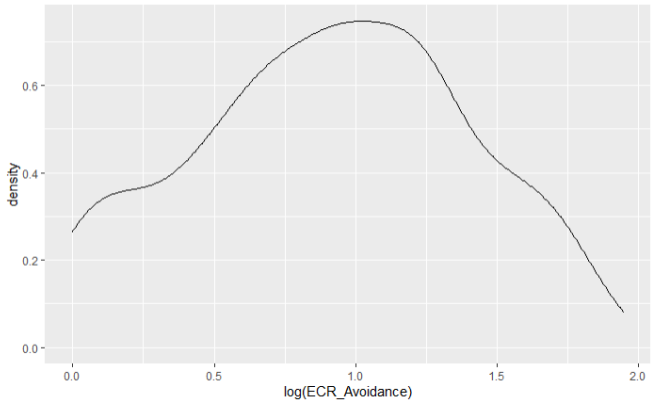
Section F: Checklist **Tick**

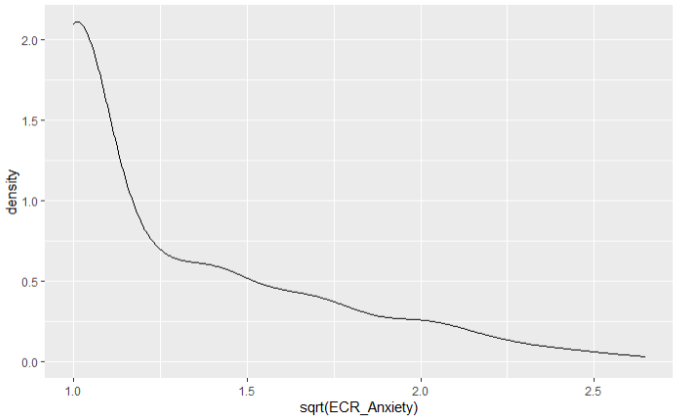
Application form	1 electronic copy	**X**
Covering letter and all other correspondence (e.g., ethics approval from other bodies, letters to parents, etc.)	1 electronic copy	**X**
Detailed proposal, including a 200-word summary/abstract	1 electronic copy	**X**
Consent/Assent form/s	1 electronic copy	**X**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

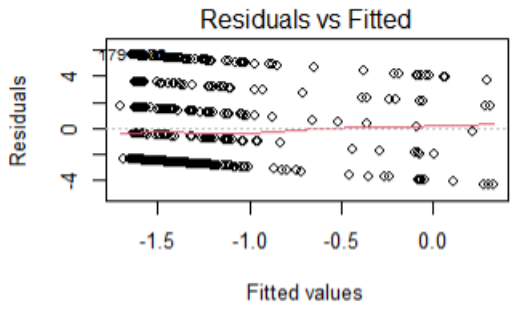
Appendix I

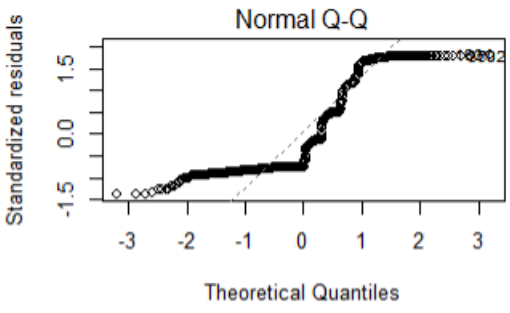
Assumption Checks

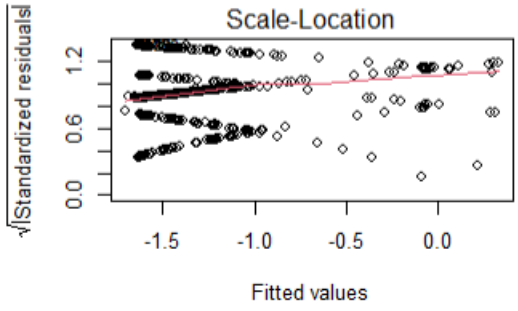


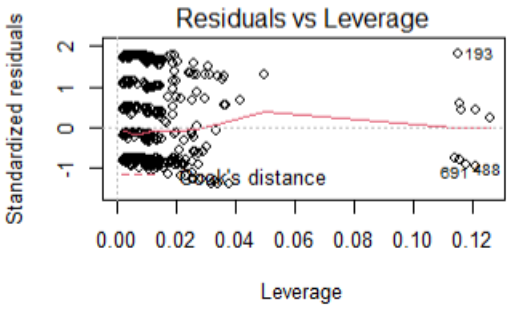






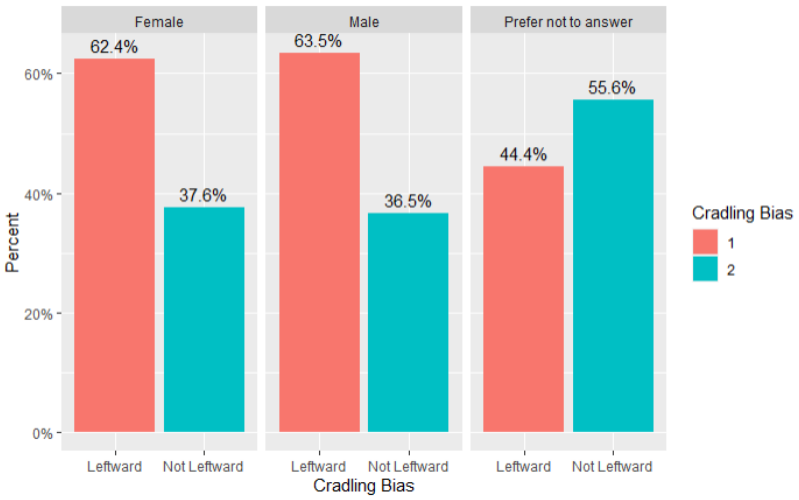




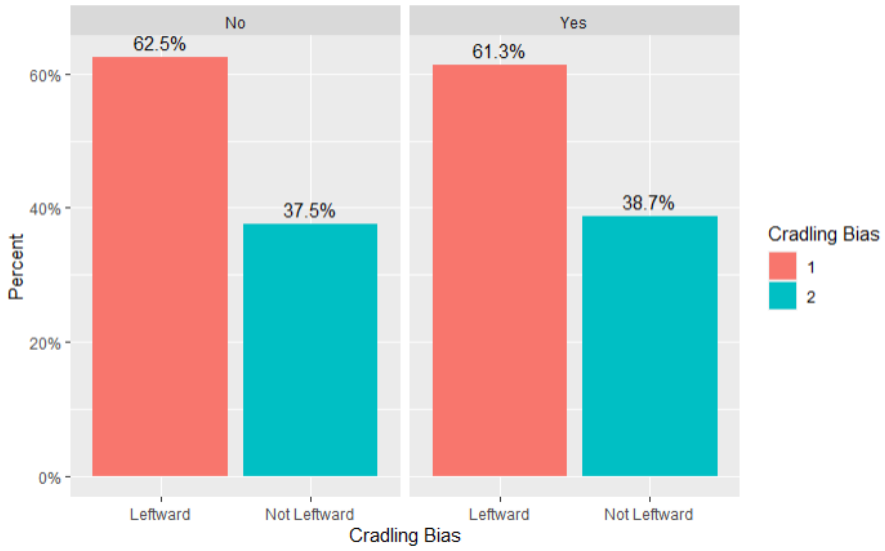


Appendix J

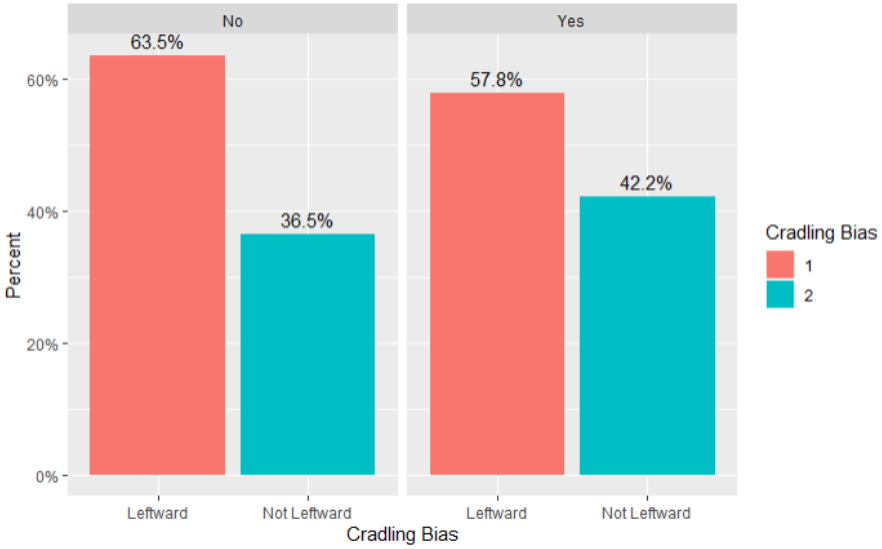
Descriptive Statistics



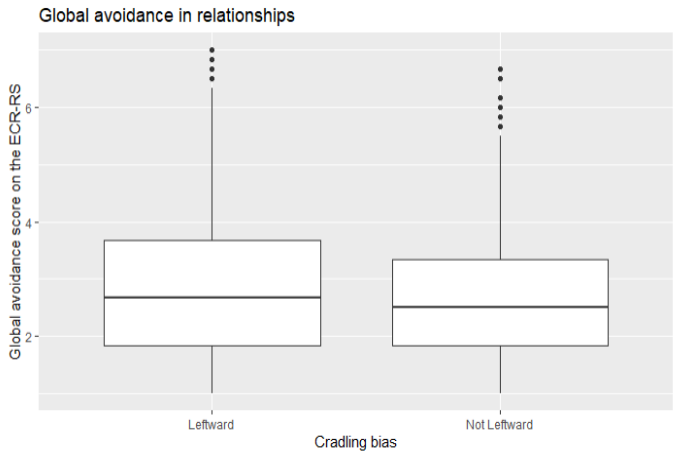
Cradling bias by gender

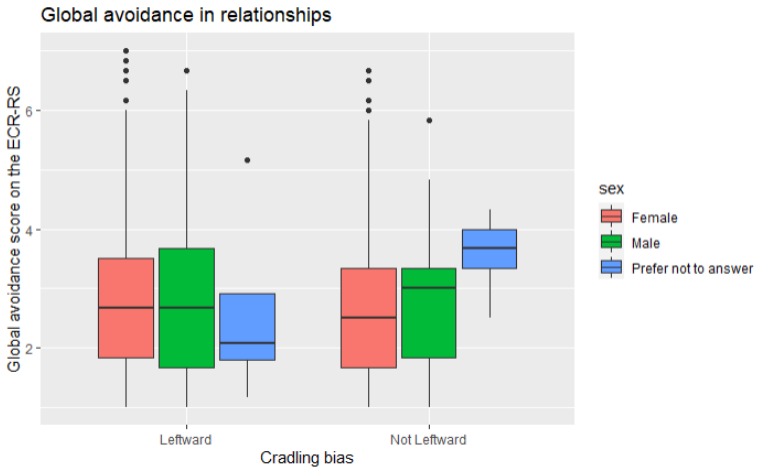


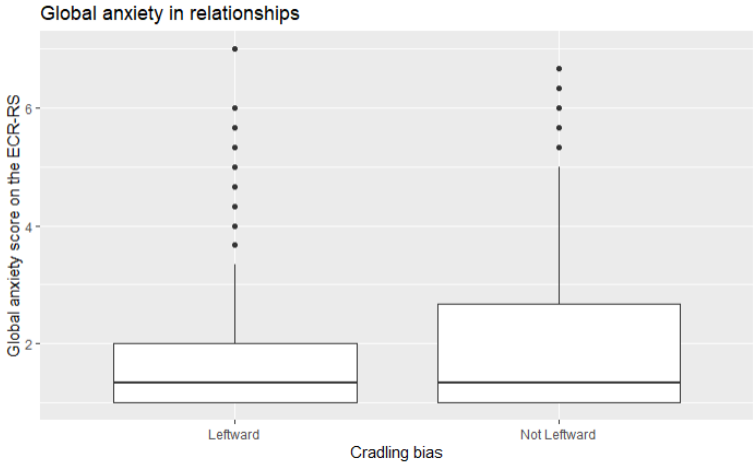
Cradling bias without and with a diagnosis of Depression

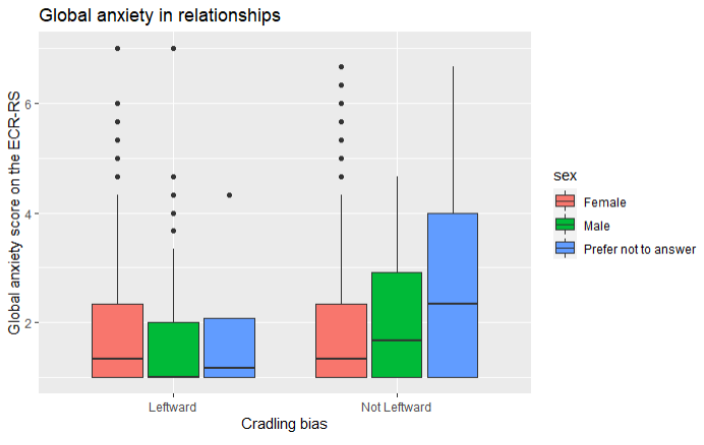


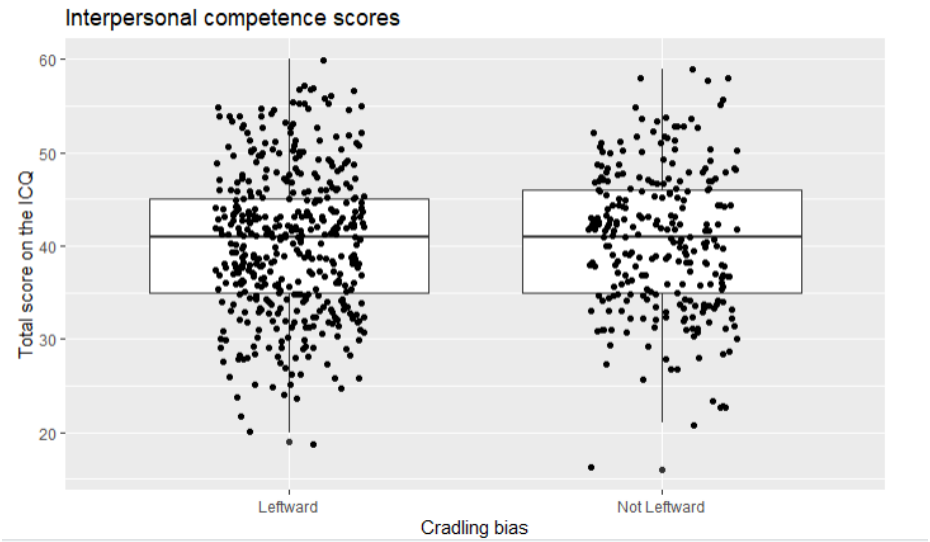
Cradling bias without and with a diagnosis of Anxiety










Interpersonal competence scores
Total score on the ICQ
60
50
40
30
20
Leftward
Not Leftward
Cradling bias