Is the Lack of Positive Parental Responses to Bodily Sensations in Childhood Related to Current Depression? Examining the Potential Mediating Role of Autonomy.

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Abstract. This study investigates the correlation between interoceptive mirroring throughout childhood, autonomous functioning, and depression symptoms during adulthood, with a specific emphasis on the influence of parenting methods. Based on self-determination theory and previous studies, we predicted that insufficient parental reactions to internal body signals, such as mocking or neglect, would reduce trust in bodily sensations. This would result in lower levels of independent functioning and an increase in depressed symptoms. We performed a cross-sectional observational study with 159 Chinese participants. We used self-designed and established questionnaires to evaluate interoceptive mirroring, autonomous functioning, and depressive symptoms. The results of our study indicate that a deficiency in interoceptive mirroring is linked to reduced autonomous functioning and increased depressed symptoms. The association between interoceptive mirroring and depressed symptoms remains significant even after accounting for parental neglect and psychological control. Although autonomous functioning plays a role in mediating this relationship, its indirect effect on depressive symptoms through autonomy is not significant. Limitations arise from the uncertain dependability of the Index of Autonomous Functioning due to cultural disparities and the unsuitability of the Basic Psychological Need Satisfaction and Frustration Scale for our particular objectives. Subsequent investigations should focus on the development of measurement instruments that are attuned to different cultures in order to improve the precision of data collection. In summary, our findings emphasize the long-lasting influence of early parental reactions on mental well-being. Specifically, the direct impact of interoceptive mirroring on depressed symptoms remains significant, even when considering other variables.

Keywords: Interoceptive Mirroring; Depression; Autonomy; Parental Responses.

1. Introduction

People vary widely in their self-motivation, with some seeing their actions as consistent with their own choices and others seeing their actions as the result of pressure. Individual differences in autonomy, according to self-determination theory, arise in part from different parenting styles; several scholars have adopted the Pediatric Symptom Checklist (PSC) scores to demonstrate the influence of parenting style on children, and there is a positive and significant association between different parenting styles and PSC scores (Makwana et al., 2023). This study provides evidence that high levels of parental psychological control and/or a lack of parental autonomy support will lead to poor autonomous functioning and eventually mental illness (e.g., depression) in adulthood.

In a previous pilot study, we showed that a lack of positive parental responses to interoception in childhood was associated with low trust in interoceptive cues. To examine the relationship between interoception and mental disorders, we are interested in the relationship between autonomy and a specific domain of parenting, i.e., parental responses to one's own interoception (i.e., interoceptive mirroring). Interoception is the processing of one's own internal bodily signals, and numerous studies have linked interoception to emotional awareness, decision making, and sense of self (Weir, 2023). We theorize that a sense of autonomy would require confidence in and awareness of one's own interoceptive states, since autonomy involves attributing the drives of actions to inner experience. A child is unlikely to develop trust in and awareness of his/her interoception if their parents tend to ridicule, neglect, dismiss, and interfere with their interoception.

Our study aims to examine whether a lack of interoceptive mirroring in childhood is associated with poorer autonomous functioning and more depressive symptoms in the present after controlling

for general parental neglect and psychological control. We hypothesize that a) a lack of (recollected) interoceptive mirroring is associated with poorer autonomous functioning; b) a lack of (recollected) interoceptive mirroring is associated with more depressive symptoms; c) autonomous functioning mediates the relationship between recollected interoceptive mirroring and depressive symptoms; and d) these relationships will hold even after controlling for general parental neglect and psychological control.

2. Method

Study type

Observational Study - Data is collected from study subjects that are not randomly assigned to a treatment. This includes surveys, natural experiments, and regression discontinuity designs.

Blinding

No blinding was involved in this study.

Study design

The study had a cross-sectional (correlational) design.

Data collection procedures

Participants are volunteers recruited through online postings and advertisements on social networking platforms. To be eligible to participate, individuals must be Chinese and over the age of 18.

Sample size

Participants are volunteers recruited through online postings and advertisements on social networking platforms. To participate, you must be Chinese and over 18 years old. Our target sample size is 148. We will try to recruit up to 200 to achieve greater statistical power.

Sample size rationale

According to Fritz & MacKinnon (2007), to achieve a power of 0.80, 148 participants are required to detect a mediation effect when the effect sizes of the α and β pathways are small to medium using bias-corrected bootstrap mediation analysis. This sample size is also larger than the minimum sample size (N = 131) required to detect a medium correlational effect size of 0.24 (see Lovakov&Agadullina, 2021) with a standard alpha error probability of 0.05 at 0.80 power.

Measured variables

The assessment of recollected interoceptive mirroring will be conducted using a self-designed questionnaire called the Interoceptive Mirroring Questionnaire (IMQ), which has excellent internal consistency (McDoald's ω=0.909). The IMQ comprises 34 items, evenly divided between positive and negative wording. The rating for each item is done using a 5-point Likert scale, where higher scores indicate higher levels of interoceptive mirroring. The Index of Autonomous Functioning (IAF; Weinstein, Przybylski, & Ryan, 2012) will be used to evaluate autonomous functioning, and it also has relatively poor internal consistency (McDoald's ω = 0.452). The 9-item Patient Health Questionnaire (PHQ-9) with good consistency (McDoald's ω=0.877) will be used to evaluate depressive symptoms as the dependent variable. Due to ethical issues, the final item (suicidal ideation) will be eliminated. Two additional factors, namely general perception of parenting and interoceptive functioning, are being recorded as potential confounders. Two variables related to general perceived parenting will be evaluated. The first variable, parental neglect, will be measured using the Emotional Neglect and Physical Neglect subscales of the Child Trauma Questionnaire with excellent internal consistency (McDoald's ω=0.908), short form. The second variable, psychological control, will be assessed using the Chinese Maternal and Paternal Psychological Control Scales (Shek, 2006) with excellent internal consistency (McDoald's ω=0.914). The Multidimensional Assessment of Interoceptive Awareness Version 2 (MAIA-2; Mehling et al., 2018) will be used to evaluate interoceptive sensibility in relation to interoceptive functioning. Within the MAIA-2 questionnaire, the introceptive attention questionnaire has excellent internal consistency (McDoald's ω=0.927); the interoceptive sensing questionnaire has good internal consistency (McDoald's ω=0.825); and the

body listening questionnair has acceptable internal consistency (McDoald's ω=0.796). In this study, we will be using several subscales to measure different aspects. These include noticing, emotional awareness, body listening, and trusting. We will assess subjective interoceptive attention using the Interoceptive Attention Scale (IATS; Gabriele et al., 2018) with excellent internal consistency (McDoald's ω=0.927), interoceptive confusion using the Interoceptive Confusion Questionnaire (ICQ; Brewer et al., 2016) with acceptable internal consistency (McDoald's ω=0.697), and difficulty identifying and describing feelings using the Difficulty Identifying and Describing Feelings subscales of the Toronto Alexithymia Scale which has two questionnaires with good (McDoald's ω=0.897) and acceptable (McDoald's ω=0.796) internal consistency respectively.

Statistical models

To test the main hypothesis, zero-order correlation analysis was conducted. To test hypotheses a and b, zero-order correlation analysis will be conducted. To test hypotheses c and d, bias-corrected bootstrap mediation analysis will be used, with 5000 resampling.

Inference criteria

We used the standard alpha level of 0.05.

3. Results

Descriptive Statistics

Table 1. Descriptive statistics of thirteen types of measuring scales

Descriptive Statistics						
	Valid	Missing	Mean	Std. Deviation	Minimum	Maximum
RIM_sum	159	0	118.774	17.743	77.000	160.000
CTQ_neglect	159	0	7.704	6.309	0.000	26.000
PsCtrl_sum	159	0	21.528	6.387	10.000	38.000
IATS_sum	159	0	31.925	8.235	10.000	47.000
MAIA_IS	159	0	29.333	7.022	8.000	45.000
MAIA_BL	159	0	8.925	3.348	0.000	15.000
MAIA_T	159	0	10.767	2.639	4.000	15.000
ICQ_sum	159	0	46.497	9.087	27.000	71.000
IAF_sum	159	0	47.220	5.084	36.000	62.000
RSES_likert	159	0	20.176	5.006	6.000	28.000
DIF_sum	159	0	17.887	6.360	7.000	35.000
DDF_sum	159	0	13.654	4.243	5.000	24.000
PHQ8_sum	159	0	6.164	4.589	0.000	21.000

For a comprehensive overview of descriptive statistics, please refer to Table 1.

The link between interoceptive mirroring measured by RIM_sum and extent of poor autonomous functioning measured by IAF_sum is positively correlated (Pearon's r=0.357, p<0.001). The association between interoceptive mirroring, as assessed by the RIM_sum, and symptoms of depression, as measured by the PHQ8_sum, is statistically negative (Pearson's r=-0.753, p<0.001).

Through a zero-order correlation analysis, a basic mediation analysis revealed that levels of autonomy functioning had an indirect impact on depressed symptoms. This impact was mediated by the influence of autonomy functioning on the trustworthiness of one's bodily sensing.

Table 2. Descriptive statistics of depressive symptoms

Descriptive Statistics	
	PHQ8_sum
Valid	159
Missing	0
Mean	6.164
Std. Deviation	4.589
Minimum	0.000
Maximum	21.000

Table 3. Frequency Tables of depressive symptoms

Frequencies for PHQ8_sum				
PHQ8_sum	Frequency	Percent	Valid Percent	Cumulative Percent
0	22	13.836	13.836	13.836
1	5	3.145	3.145	16.981
2	11	6.918	6.918	23.899
3	12	7.547	7.547	31.447
4	14	8.805	8.805	40.252
5	13	8.176	8.176	48.428
6	12	7.547	7.547	55.975
7	17	10.692	10.692	66.667
8	9	5.660	5.660	72.327
9	5	3.145	3.145	75.472
10	12	7.547	7.547	83.019
11	8	5.031	5.031	88.050
12	2	1.258	1.258	89.308
13	5	3.145	3.145	92.453
14	6	3.774	3.774	96.226
15	1	0.629	0.629	96.855
16	2	1.258	1.258	98.113
19	1	0.629	0.629	98.742
20	1	0.629	0.629	99.371
21	1	0.629	0.629	100.000
Missing	0	0.000		
Total	159	100.000		

Individuals with high scores in RIM_sum exhibit greater autonomy functioning ability (a=0.1, $p<0.001$), indicating that they are more independent and less susceptible to external influences, such

as parental control, compared to individuals with low scores in RIM_sum. Furthermore, individuals with better autonomy functioning ability are less likely to experience or have relatively mild levels of depressive symptoms (b=-0.15, p=0.021). The bias-corrected bootstrap confidence interval for the indirect effect (ab=-0.015, p=0.037), based on 5,000 bootstrap samples, was entirely bellow 0 (-0.031 to -0.003). This indicates that interoceptive mirroring has an influence on the severity of depressive symptoms through levels of autonomy functioning. The effect is negative, meaning that higher levels of interoceptive mirroring are associated with a lower likelihood of experiencing depressive symptoms. Additionally, there is evidence indicating that the levels of interoceptive mirroring have a negative impact on depression symptoms, regardless of its effect on autonomy functioning (c'=-0.12, p<0.001).

After controlling for the impact of abuse and psychological control, our analysis revealed that the direct effect, which is interoceptive mirroring levels, still exhibit a statistically significant negative connection with depressed symptoms. The coefficient for this correlation is -0.068, and the p-value is 0.017. However, the indirect effect, specifically the link between interoceptive mirroring and autonomous functioning, is no longer statistically significant. The p-value, which measures the probability of obtaining results as extreme as the observed results, is 0.316, over the threshold of 0.05.

4. Discussion

In this study, we found that the lack of interoceptive mirroring indeed associated with poorer autonomous functioning and more depressive symptoms, which means lack of positive parental responses will decrease bodily sensations in childhood and this influence will last till adulthood, which cause more depressive symptoms. Moreover, autonomous functioning can act like a mediator of the relationship between recollected interoceptive mirroring and depressive symptoms, but after controlling for abuse and psychological control, the direct effect, which is better interoceptive mirroring can cause fewer depressive symptoms, still exist and statistically significant. However, the indirect effect, which is through considering the effect of autonomy, is not statistically significant anymore.

The biggest limitations of this study are the reliability of the Index of Autonomous Functioning (IAF) questionnaires. The potential cause of this issue could be attributed to cultural disparities, resulting in a lack of complete comprehension among Chinese participants regarding the reversely worded questions. Consequently, this is likely to have a relatively large impact on the study's findings. Further studies can prioritize the creation of the more suitable contents of IAF questionnaires, with the aim of developing a questionnaire that serves the same investigative objective but aligns more effectively with the Chinese perception and comprehension. The increasing of credibility in the IAF questionnaire will undoubtedly result in more accurate outcomes.

Furthermore, the Basic Psychological Need Satisfaction and Frustration Scale (BPNSNF) evaluates the degree of autonomy that is well-suited to the Chinese culture. Unfortunately, we cannot use this questionnaire for our research because our research aims are different. This questionnaire can be utilized by researchers for upcoming researches to examine the level of satisfaction regarding the three fundamental psychological needs, including autonomy and relatedness.

5. Conclusion

In summary, our findings indicate that a lack of positive parental reactions to bodily sensations throughout childhood is directly associated with the severity of contemporary depression. Additionally, the function of autonomy is significant in explaining the indirect impacts of this association. Nevertheless, upon eliminating the impact of abuse and psychological control, we discovered that the previously observed indirect impact associated with autonomy is no longer present.

However, the direct influence between parental responses, as measured by interoceptive ability levels, and the extent of depressive symptoms remains intact and is statistically significant.

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