

# Exploring the relationship between early childhood adversity, linguistics and mental health disorders

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## Background

Childhood Emotional Neglect (CEN) has been described as 'emotional unresponsiveness, unavailability and neglect characterised by lack of interaction between parent and child.'<sup>(1)</sup> It has been found to increase risk factors for physical and mental health issues, associated with future cerebrovascular events<sup>(2)</sup> and is linked to adulthood obesity.<sup>(3)</sup> CEN has also been strongly implicated in the impairment of brain structures during childhood development, particularly the stress-sensitive hippocampus, which is a small area of the limbic system in the brain associated with memory, emotions and many other cognitive functions.<sup>(4)</sup> In a meta-analysis by Riem et al.<sup>(5)</sup> Opel et al it was found that CEN was consistently associated with reduced hippocampal volume in patients with depression, suggesting that that the hippocampal changes found in depression can be ascribed to increased levels of CEN<sup>(6)</sup>.

A more subtle and insidious consequence of CEN is the risk of sufferers have difficulty in relating to others within a variety of social arenas. This may be due to higher levels of social phobia<sup>(7)</sup> or may be attributed to enhanced fear and avoidance responses.<sup>(8)</sup> Studies have found significant positive correlations between the level of CEN experienced and the severity of depression<sup>(9)</sup>, and have found CEN to be an independent predictor of depression recurrence<sup>(10)</sup>. In line with previous discussion on the social impact of CEN, dysfunction in social relations has been further linked to the initiation and perpetuation of depression,<sup>(11)</sup> suggesting a socialisation mechanism between CEN and depression.

Language is described as a method of communication unique to humans, that allows the sharing of 'ideas, emotions, and desires.'<sup>(12)</sup> Fluency relates to the generalised impression of 'smoothness' in speech, common markers of disfluency being the length and frequency of pauses, and the use of fillers (e.g. um / eh).<sup>(13)</sup> Fillers are most often found in the same locations as pauses and are thought to reflect planning problems,<sup>(14)</sup> or difficulty in finding an appropriate word.<sup>(15)</sup> However they are also theorised to function as collateral signals between speakers throughout discourse, e.g. signalling engagement or inviting the addressee to speak.<sup>(12)</sup> If elements of a person's language is lacking in fluency this can make them subtly difficult to relate to, affecting how others perceive them, react to them and potentially affect how they then view themselves. Therefore, the notion that language could act as a framework to explain the development of mood disorders can be utilised to find a link between processing of thoughts through the disfluency in language use.

The three sequela of CEN mentioned above (cognitive dysfunction, reduced hippocampal volumes, and depression) are all implicated in language production. There is a wealth of research linking working memory to language,<sup>(16,17)</sup> many symptoms of mood disorders include changes in speech and language.<sup>(18)</sup> CEN has been shown to be a factor in improper language production, having a negative impact on speech and language and the way one relates to the world around them via the means of speech.<sup>(17,18)</sup> One may therefore expect to find a positive correlation between fillers per utterance and higher levels of CEN as this would signal a more disjointed incohesive way of speaking. If CEN somehow disrupts someone's ability to speak a more 'natural' way, this subtle disconnect could compound feelings of isolation, loneliness etc. and these factors may then lead to an increased risk of depression. There is convincing evidence that CEN engenders a vulnerability to mood disorders, through a possible pathway of persistent hippocampal structural changes, similar to those seen in depression. Investigating what features of language pertain to discourse flowing naturally, specifically fillers, can allow us to understand how our use of language may be implicated in the transition from CEN to depression.

## Aims

The main avenue for exploration in this is whether issues of social disconnect (characteristic of depression),<sup>(7)</sup> can be detected through subtle linguistic changes (the use of fillers per utterance), and whether this correlates to the level of CEN an individual has experienced.

The overall hypothesis is that fluency mediates the relationship between childhood adversity and depression.

This study examines the hypotheses that:

1. There will be a positive relationship between scores on the EN subscale of the CTQ and depression symptomology (defined using Becks' Depression Inventory, BDI)
2. There will be a positive relationship between CEN score and disfluency (determined using rate of filler use per utterance)
3. There will be a positive relationship between BDI and dysfluency

## Method

47 participants took part (all 1st year university students, mean age = 19.05; Male n=20; Female n= 26; no gender data n= 1).

The emotional neglect subscale of the Childhood Trauma Questionnaire (CTQ- EN) was administered to obtain CEN levels

Participants were given specific guidance in completing 5 hippocampus dependant tasks:

- Episodic Memory (EM) task – describe an event one month and 5 years in the past.
- Episodic Future Thinking (EFT) task – describe an event one month and 5 years in the future.
- Scene Construction task – describe an imagined scene of a Circus Tent

Data from these tasks was also used at assess language (fillers/utterance). All tasks were recorded, transcribed and then annotated for fillers.

Becks' Depression Inventory (BDI) was used as a self-report measure of depression symptomology

Correlations between all of these measures were plotted and assessed (Spearman's Rho;  $p < 0.05$  significance)

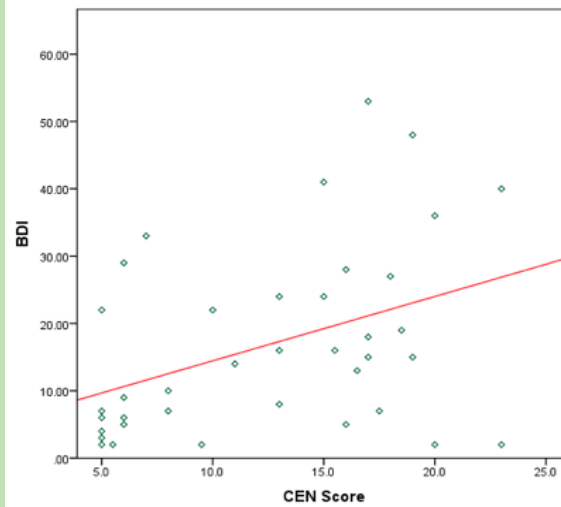
## Results

This study utilised data from 47 participants. Not all data was available for all information collected, leaving the following data sets: Age (n=44); Sex (n=46); CTQ-EN (n=46); BDI (n=38); EI (n=37); EM1M (n=44); EFT5Y (n=45); EFT1M (n=42); SC (n=46).

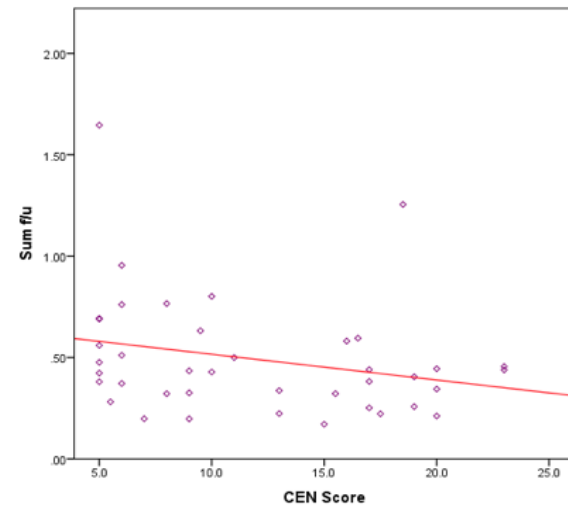
CTQ-EN scores show significant positive correlation with BDI scores ( $r = 0.378$ ,  $p = 0.01$ ) (See Graph 1). CEN and the total sum of fillers per utterance show a significant negative correlation at the 0.05 level ( $r = -0.275$ ,  $p = 0.043$ ) (See Graph 2)

BDI and the total sum of fillers per utterance show a significant negative correlation at the 0.05 level ( $r = -0.275$ ,  $p = 0.043$ ) (see Graph 3)

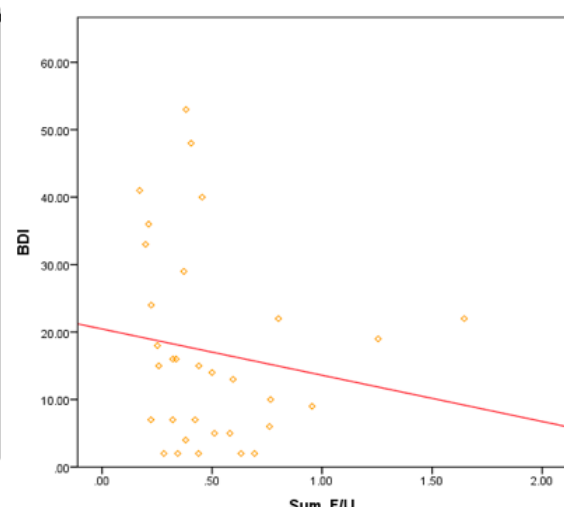
By using both EI and BDI as control measures, this lead to a significant change to the correlation where the negative relationship between CEN and fillers/utterance ( $r = -.440$ ,  $r = 0.032$ ) became no longer statistically significant (see Table 1;  $r = -.362$ ,  $r = 0.098$ ).



Graph 1: Scatterplot depicting CTQ-EN Scores in relation to BDI Scores



Graph 2: Scatterplot depicting CTQ-EN Scores in relation to the total sum of fillers per utterance



Graph 3: Scatterplot depicting the total sum of fillers per utterance in relation to BDI scores

Control Variables			F/U	CEN score	EI	BDI
-none <sup>a</sup>	F/U	Correlation	1.000	-.440*	.266	-.234
	CEN score	Correlation	-.440*	1.000	-.186	.356
	EI	Correlation	.266	-.186	1.000	-.032
	BDI	Correlation	-.234	.356	-.032	1.000
Combined EI & BDI	F/U	Correlation	1.000	-.362		
	CEN score	Correlation	-.362	1.000		

Table 1: EI and BDI controlled relationship between CEN and total fillers per utterance

## Discussion

As expected, the results of this study regarding CEN and depression aligned with the literature: higher levels of CEN were associated with greater depression symptomology. This strengthens the argument that CEN is a risk factor for depression.<sup>(19)</sup>

The hypothesis of this study proposed that by using fillers per utterance as a marker of dysfluency, CEN levels would correlate to higher levels of disfluency. However, the results regarding this relationship proved opposite: higher levels of CEN had a negative correlation with fillers per utterance.

Like pauses, fillers are mainly thought to be due to planning difficulties<sup>(15)</sup> so why filler frequency did not similarly correlate with CTQ emotional neglect scores is interesting. It may be because fillers are not always a measure of disfluency.<sup>(13)</sup> As described in the introduction, fillers are theorised to have many legitimate functions. Furthermore, fillers are more frequently used by men and by speakers from higher educational backgrounds.<sup>(20)</sup> Participants in this study were predominantly female and all subjects were at a tertiary education level, therefore, these two variables, gender and education, could have distorted the results for filler frequency and lead to a more negative correlation than expected.

By using both BDI and EI as control measures, the negative correlation was no longer statistically significant showing that richness of speech and depressive symptoms may have distorted the results and caused a more significant negative correlation than it should. The lack of results here may be down to the methodology of this study. Hippocampal function data was not present for 10 of the participants (21.28% of total study sample). All ten of these participants had CTQ-EN scores placing them in the 'Severe-Extreme' category for CEN. This means that there was significant loss of data at the most extreme of CEN scores therefore, correlations if present may not have been revealed. Furthermore, depression data was missing for nine participants (19.15% of the total study sample), meaning that these correlational assessments lacked the power to identify any possible patterns.

## Conclusion

This study confirmed the relationship between childhood emotional neglect and depression, and in doing so further emphasised the importance of developing our understanding of this transition.

The correlation between CEN and fillers per utterance was found to be negative and therefore results of this study were unable to fully conclude a hippocampal or linguistic mechanism for the correlation between CEN and depression. Nonetheless language remains an integral part of the human experience operating as an expression of our cognitions but also facilitating and moulding our thoughts and views.

Therefore, further research is required to ascertain whether language (functioning via the hippocampus or otherwise) is vulnerable to the maladaptive social influences of CEN and can be used as a predictor for future psychiatric pathology. Dysfluency is a multi-faceted concept, of which the use of fillers plays just one part. Future studies could expand to include and measure a wider range of dysfluency markers. This would allow for a more comprehensive picture of participant dysfluency to be built, and analysed against CEN, the hippocampus and depression accordingly.

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