



## Emotional reactivity and regulation associated with fluent and stuttered utterances of preschool-age children who stutter



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### ABSTRACT

**Purpose:** The purpose of this study was to assess the relation between emotional reactivity and regulation associated with fluent and stuttered utterances of preschool-age children who stutter (CWS) and those who do not (CWNS).

**Participants:** Participants were eight 3 to 6-year old CWS and eight CWNS of comparable age and gender.

**Methods:** Participants were exposed to three emotion-inducing overheard conversations—neutral, angry and happy—and produced a narrative following each overheard conversation. From audio-video recordings of these narratives, coded behavioral analysis of participants' negative and positive affect and emotion regulation associated with stuttered and fluent utterances was conducted.

**Results:** Results indicated that CWS were significantly more likely to exhibit emotion regulation attempts prior to and during their fluent utterances following the happy as compared to the negative condition, whereas CWNS displayed the opposite pattern. Within-group assessment indicated that CWS were significantly more likely to display negative emotion prior to and during their *stuttered* than *fluent* utterances, particularly following the positive overheard conversation.

**Conclusions:** After exposure to emotional-inducing overheard conversations, changes in preschool-age CWS's emotion and emotion regulatory attempts were associated with the fluency of their utterances.

**Learning outcomes:** After reading this article, the reader will be able to: (1) describe various measures of emotional reactivity and regulation, including parent-based reports and behavioral coding, and how they may contribute to childhood stuttering; (2) explain emotional differences between the stuttered and fluent utterances of CWS and CWNS; and (3) discuss how emotions may contribute to CWS' instances of stuttering.

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Abbreviations: CWS, children who stutter; CWNS, children who do not stutter; GEE, generalized estimating equations; BSQ, Behavior Style Questionnaire; CBQ, Children's Behavior Questionnaire; LU, length of utterance; SES, socio-economic status.

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## 1. Introduction

Attention has recently been paid to emotional factors in childhood stuttering, specifically focusing on characteristics such as emotional reactivity and regulation (e.g., Anderson, Pellowski, Conture, & Kelly, 2003; Conture, Kelly, & Walden, 2013; Choi, Conture, Walden, Lambert, & Tumanova, 2013; Eggers, De Nil, & Van den Bergh, 2010; Eggers, De Nil, & Van den Bergh, 2012; Eggers, De Nil, & Van den Bergh, 2013; Johnson, Conture, & Walden, 2010; Kefalianos, Onslow, Block, Menzies, & Reilly, 2012; Ntourou, Conture, & Walden, 2013; Schwenk, Conture, & Walden, 2007). Although results of these empirical studies as well as related speculation have not clarified all salient aspects of the association of emotion and childhood stuttering, they have provided evidence to support the continued investigation of this association.

### 1.1. Emotional associates of childhood stuttering: Caregiver-based report

Anderson et al. (2003) reported that children who stutter (CWS), when compared to children who do not stutter (CWNS), were more likely to exhibit temperamental profiles consistent with vigilance, nonadaptability to change, and irregular biological functions based on parental completion of the Behavioral Style Questionnaire (BSQ; McDevitt & Carey, 1978). Likewise, Eggers et al. (2010) reported that CWS, when compared to CWNS, exhibited significantly lower inhibitory control and attention shifting, as well as significantly higher anger/frustration, approach and motor activation, based on parent completion of the Dutch version of the Children's Behavior Questionnaire (CBQ-D; Van den Bergh & Ackx, 2003).

Based on three groups of items (i.e., items related to emotional reactivity, emotional regulation and attention regulation) from the BSQ, Karrass et al. (2006) reported that preschool-age CWS, when compared to their CWNS peers, were significantly more reactive, displayed greater difficulty regulating emotions, and had poorer attention regulation. Similarly, Felsenfeld, van Beijsterveldt, and Boomsma (2010) reported that probable stuttering and highly nonfluent children, when compared to typically fluent children, received more problematic scores on parent-based questionnaire ratings of attention, with attention often suggested to be a strategy to regulate emotion (e.g., Rothbart, Ahadi, & Evans, 2000). Taken together, the above empirical findings suggest that certain aspects of emotionality differentiate CWS and CWNS, and these differences may be associated with the difficulties CWS have establishing normally fluent speech.

Results from the aforementioned studies are promising and provide a substantive objective component in the assessment of children's temperamental characteristics (Henderson & Wachs, 2007; Wachs & Bates, 2001); however, it should be noted that these studies address only part of the emotional picture (Campos, Frankel, & Camras, 2004). For example, caregiver reports that are based on relatively long epochs of observation provide insights into more stable, trait-like aspects of emotion (i.e., temperament; Rothbart, Ahadi, Hershey, & Fisher, 2001), whereas behavioral observation provides information on more state-like, variable and dynamically changing aspects of emotion (Cole, Martin, & Dennis, 2004). Therefore, caregiver reports are best considered part of a comprehensive, multi-method means to study emotions in young children (see Campbell & Fiske, 1959 for further discussion of convergent lines of evidence). The use of additional methodological approaches to study emotion augment caregiver reports and address salient realities of childhood stuttering, for example, that stuttering varies considerably within and between situations, conversations, etc.

### 1.2. Emotional associates of childhood stuttering: Behavioral observations

As an example of a methodological alternative to caregiver reports, Schwenk et al. (2007) used coded behavioral observations to compare the ability of preschool-age CWS and CWNS to maintain attention to a task and ignore irrelevant background stimuli. They reported that CWS were significantly more likely to redirect attention away from a task, via repeatedly looking at nontask stimuli (i.e., noise associated with a motorized camera). These findings were taken to suggest CWS have difficulty habituating to irrelevant environmental stimuli.

In order to further assess CWS's emotional processes, researchers (e.g., Arnold, Conture, Key, & Walden, 2011; Johnson et al., 2010; Walden et al., 2012) assessed two aspects of emotion—positive and negative emotion. Specifically, Johnson et al. (2010) investigated the frequency of expressive behaviors displayed by preschool-age CWS and CWNS after receiving a desired (i.e., positive condition) versus a disappointing gift (i.e., negative condition). In the disappointing gift condition, CWS displayed significantly more negative emotional expressions than CWNS. Furthermore, CWS were more disfluent after receiving the desirable gift than the disappointing gift, suggesting that increased disfluency is related to the emotional tenor—*positive* in this case—of the associated communicative situation. To further address this issue, Arnold et al. (2011)—on the basis of coded behavioral observations—assessed preschool-age CWS's and CWNS's speech following positive and negative emotionally-arousing background conversations. Findings indicated that decreased duration and frequency of behavioral regulatory strategies were associated with significantly more stuttering for CWS. Using similar coded behavioral observations, Walden et al. (2012) reported that higher stuttering in CWS was significantly related to more emotional arousal/reactivity when associated with lower emotion regulation. Conversely, CWS's stuttering was lower when negative emotion was coupled with regulatory behaviors. This interaction of emotion and regulatory behaviors was taken by Walden et al. (2012) to suggest that emotion is part of the "causal nexus of developmental stuttering" (p. 641). Said another way, if emotion was purely a reaction to stuttering (Alm, 2004), then its regulation would not result in decreases in

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