



Parental Anxiety

Linguistic markers of emotion in mothers of sickle cell carrier infants: What are they and what do they mean?

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ABSTRACT

Objective: The objectives were to examine emotion-related language in mothers' narratives about newborn screening, and test the correlations between language and self-reported emotion and behavior. **Methods:** Transcripts of interviews with mothers of infant sickle cell carriers were analyzed with word count software for the prevalence of emotion-related words in narratives about newborn screening. Word counts were compared to population norms for spoken language using one-sample *t*-tests. Anxiety-related words were correlated with self-reported anxiety and avoidance of genetic testing.

Results: 187 transcripts were analyzed, in which there was a higher percentage of anxiety words ($m = .38\%$) than population norms ($m = .18\%$), $t(186) = 10.59, p < .001, CI = .16-.23$. Anxiety-related word use was positively correlated with self-reported previous anxiety, $r_s(185) = .24, p = .001$. Self-reported previous anxiety, but not word use, was correlated with mothers' avoidance of undergoing genetic testing themselves $r_s(152) = .25, p = .002$.

Conclusion: Mothers of sickle cell carrier infants reported anxiety upon learning their child's condition. Anxiety-related words in maternal narratives were correlated with their reports of past, but not present, emotions.

Practice implications: Researchers and clinicians should use caution in assuming that word choices reflect state emotions. Self-report methods may be preferable for predicting behavioral outcomes.

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1. Introduction

Assessing the language that patients or other populations use to describe their experiences has the potential to provide insight into their emotions about the experience. Previous linguistic theory and psychological research [1] suggest that people's emotions and attitudes can be conveyed through their use of evaluative words like *good*, *bad*, *beautiful*, or *ugly* that convey positivity or negativity about a subject [2]; words denoting actual specific emotions, such as *anger* or *sadness* [3]; and other types of *affect markers*, such as adverbs or verbs with emotional connotations, i.e. *relish* or *begrudge* [4,5].

Emotion-related word choices have been repeatedly examined in the context of individuals' *narratives*. Narratives are defined as spoken or written descriptions of personally experienced events, and are characterized by a sense of meaning ascribed by the narrator to the described events [6]. The expression of feelings and/

or an evaluation of the described events have been described as a method conveying the meaning that a narrator ascribes to the described events [6]. Emotional experience, including emotions specific to a narrative topic, has been found to be associated with linguistic cues—the emotional connotations of the words that people choose [7,8]. Analyzing patients' word choices to make inferences about their emotional experience – that they are experiencing unusually high levels of anxiety or sadness, for example – could be used when direct self-reports are unavailable.

Methods to quantify the emotional content of narratives include manual or automated content analysis, using coding dictionaries that categorize emotion-related words by their general (*positive*, *negative*) and/or specific (e.g., *anxiety*, *sadness*) emotional meaning. Automated analysis of the prevalence of emotion-related words in text files can be conducted with software programs such as Linguistic Inquiry and Word Count (LIWC) [9,10], whose identification of specified categories of emotion words has been found to correlate with the judgments of human coders [11].

There is experimental, as well as correlational, evidence that the prevalence of emotion-related words, as measured by coders or by LIWC, is a reflection of speakers' or writers' actual emotional experience. For example, inducing specific emotions in participants has been found to result in the participants subsequently

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using a higher frequency of words consistent with the induced emotion [12]. For speakers or writers who describe personally meaningful events in narratives [6], using emotion-related words has been found to have prognostic significance, predicting narrators' subsequent emotion-related [13–15] health outcomes. Treating emotional experience as a factor that can affect health outcomes is supported by findings that positive emotions can influence cardiovascular and endocrine function [14] by buffering reactions to stress, improving cardiovascular recovery, and decreasing exposure to cortisol [13,16]. Conversely, negative emotional experiences have been correlated with an increased risk of negative subsequent health outcomes, including coronary heart disease [17].

Consistent with the idea that word choices can be used as a measure of emotional states, narrators' use of positive emotion words has been negatively correlated with subsequent clinic visits and symptoms of illness [18]. Conversely, narrators' usage of negative emotion words has been positively correlated with subsequent clinic visits and symptoms [11], as well as with depression symptoms [19]. Emotion-related word use has even been found to predict narrators' longevity [16].

1.1. Clarifying the meaning of emotion-related word use

Despite the evidence that word choices reflect emotional states, assessing emotional outcomes via people's word use is hampered by uncertainty about the *type* of emotional experience expressed by emotion-related word use. One unexpected finding from the literature on emotion-related word choices is that several studies have failed to find a correlation between narrators' use of negative-emotion words when describing traumatic experiences and their self-reported emotional distress [20–22]. This could be because the self-report measures of distress were measures of global distress rather than distress specific to the traumatic event that narrators described. In addition, emotional reactions to the traumatic event may have dissipated by the time participants describe the experience and report their current level of emotional distress. Clarifying the relationship between emotion-related word use and self-reported emotion may help researchers and/or clinicians to understand the type of emotional experience that is being expressed in participant or patient communications about past experiences.

1.2. Present research

The present research addresses the question of whether emotion-related word use reflects emotions specific to a narrative's content, as suggested by linguistic theory [5], rather than the narrators' current, generalized emotional state. The goal of the current study was to test whether the prevalence of emotion-related words in the narratives of mothers of sickle cell carrier infants would reflect the mothers': (a) current emotional states; (b) current emotions specific to the concern elicited by the events in the narratives; or (c) the emotions the mothers remember having felt during the newborn screen and results disclosure. If, as theory suggests [23], people use emotion related language to assign meaning to narrative topics, emotion-related word use should be correlated with self-reported emotion specific to the event discussed, rather than state emotion.

(a) *Prediction 1.* Anxiety-related word use would significantly correlate with topic-specific anxiety: previous anxiety (the anxiety interviewees remember having felt), and/or infant health worries (current levels of anxiety about the precipitating concern described during the interview).

(b) *Prediction 2.* Anxiety-related word use would not correlate with state anxiety (reflecting the interviewees' generalized emotional state at the time of interview), replicating previous findings [20–22].

1.3. Context

The narratives examined for this study focused on the recollections of mothers whose infants were revealed to be sickle cell carriers during routine newborn screening for congenital conditions. Negative emotions, especially anxiety, have been proposed to be potential outcomes of notifying parents that their infant is a carrier of an autosomal recessive disease [24–26]. In the United States, as well as in other countries, newborn infants are routinely tested for genetic and other congenital conditions shortly after birth. In addition to identifying infants with actual diseases, screening identifies infants who are heterozygous "carriers" of only one of the two mutations necessary for an autosomal recessive disease. Though carriers will never develop the actual disease, miscommunication or misunderstanding may lead parents to worry unnecessarily about their child's prognosis.

Despite the concerns about potential adverse effects, parents of carrier infants *are* often notified of their child's condition, partly so that parents may make a decision about genetic testing to determine if they are both carriers. If both parents were carriers, subsequent children would be at risk for having the actual disease. Similarly, the infant's carrier status could be of interest for his or her eventual reproductive decision-making.

1.4. Secondary goal

An additional goal of the study was exploratory: to examine the extent to which participants' anxiety-related word choices and self-reported anxiety correlate with a potentially anxiety-related motivation, the avoidance of undergoing genetic testing themselves. Anxiety about medical conditions has been linked to both information-seeking and information-avoiding behaviors [27]. Genetic screening avoidance in the current study was assessed via mothers' reports of having undergone screening for being a sickle cell carrier themselves, and, if not, their intention to do so.

2. Method

2.1. Setting

This study was a secondary analysis of telephone interviews with mothers whose infants had been found to be sickle cell carriers through routine newborn screening. These interviews were conducted as part of a statewide observational study of newborn screening disclosure practices, the Wisconsin Project on Improvement of Communication Processes and Outcomes after Newborn Genetic Screening. The purpose of the larger project was to evaluate physicians' disclosure of newborn screening results and parents' reactions to those results, and did not include an interventional component [28]. The interviews were conducted between March 2008 and November 2010, three to five months after newborn screenings had taken place. Participants were offered a gratuity in the form of a \$20 US gift certificate.

2.2. Participants

Interviews were eligible for inclusion if the interviewee: was the mother and primary caregiver of an infant sickle cell carrier; conversant in the English language and had been previously notified of their infants' newborn screening result.

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