

Do Events on One Day Influence the Perception of Stuttering on Subsequent Days?

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Abstract

Objective: The reaction of children and adolescents who stutter to their own speech and their perception about how others reacted to them were examined over time. Day-to-day changes in perception of own-speech and emotional impact of others on their stuttering were assessed using the new Daily Questionnaire.

Design: Nineteen participants (mean age 13.10 years, SD=2.8 years) who attended an intensive stuttering treatment completed the Daily Questionnaire on 19 successive days.

Results: The Daily Questionnaire assessed day-to-day experiences of the participants and the influence these experiences had on the participant's life. Significant cross-lagged panel correlations between the impact of other people's behavior on the previous day with perception of general speaking abilities on the current day were found and between the emotions reported on the previous day and the perception of their own speaking abilities on the current day.

Conclusions: The experiences of children and adolescents who stutter fluctuated over time because of the perception of their own and other people's behavior. These perceived experiences affected how the participants perceived their speech on subsequent days.

Keywords: Children and Adolescents who Stutter; Day-to-day Experiences; Perception; Impact of Stuttering; Treatment; Affect; Fluency Disorder

Introduction

It is necessary to document the outcome of treatments in speech pathology and health issues in general. Outcome research in stuttering has focussed mainly either on overt symptom changes [1-4] or on qualitative changes in affective behavior [5-8]. While it is important to assess both these domains [9], other outcomes need monitoring too. Yaruss suggested that one factor that may influence treatment outcome was the diverse experience of people who stutter during intervention and in their lives in general [10]. An example of such experiences is given in the qualitative study of Hearne, Packman, Onslow and Quine about stuttering during the adolescent years; in that study, two participants reported that their supportive network of friends shielded them against teasing by others [11]. Participants also reported that group therapy was preferred to individual therapy as working with others who deal with similar problems was motivating and more closely related to the real world. Erickson and Block described how adolescents who stutter viewed their own communicative competency as below average, showed apprehension towards communicating with others, and experienced more teasing and bullying than fluent peers [12]. This is in line with the study of Blood and Blood who also found that adolescents who stutter rated themselves as having lower communicative competencies than their fluent peers, and were at a higher risk of experiencing bullying [13]. While it seems obvious that

such diverse experiences could influence treatment outcomes, the question that arises is how such influences could be measured?

The topic of measuring the impact of diverse experiences on treatment outcomes has been examined in allied health areas such as stress disorders [14-17]. In stress disorders research, one approach has been to establish how major life events mediate stress levels. One study showed that while such life events had an impact on stress levels, they were only responsible for a small portion of the change in observable stress-related symptoms [17]. Another approach has focused on the minor life events and seeing whether fluctuations in these relate to an individual's stress as experienced in daily life [16]. Studies have shown that the changes in these minor daily events are better predictors of stress level, psychological distress and negative affect, than major life events [14,15,17,18]. Brantley et al. developed the Daily Stress Inventory (DSI), a standardized, valid and reliable 58-item self-report instrument for adults to assess the impact of minor daily stressful events on a person's life. After identifying events one has experienced in the past 24 hours, the respondent rates the stressfulness of the event on a 7-point Likert scale (1= "occurred but was not stressful" to 7= "caused me to panic"). Blood, Wertz, Blood, Bennett and Simpson documented the perceived daily stress in adults who stutter and compared it with adults who did not stutter [19]. Apart from subjective and objective measurements of stuttering severity, Blood et al. [19] measured the participants' life stress with the Social Readjustment Rating Scale [20] and the participants' daily stressors with the DSI [18] for 22 consecutive days. No difference in life stressors between the two subgroups was found. Results of the Daily Stress Inventory showed that the subgroup of people who stutter identified a higher number of daily

'hassles' as stressors, this included a higher number of daily stressors with regard to interpersonal problems. Half of these interpersonal problems were related to speaking performance. The study also found that daily stressors were associated with an increase in dysfluent speech.

The present study examined whether changes in reported daily experiences were related to reports about stuttering. More specifically, the study analysed whether the reports about how a participant felt about his or her speech from the previous day affected their reports on the current day. These findings fill the gap in knowledge about the relation of stuttering and minor life events with children and adolescents. The fluctuations in daily experiences were measured during a three-week intensive therapy program. The hypothesis was a child or adolescent's rating of comparatively minor daily events, such as a reaction of another person towards a dysfluency on the previous day will be correlated with changes in self-ratings on the following day.

Testing this hypothesis required that daily events and experiences of children and adolescents who stutter were measured over a period of time. The Daily Questionnaire (see Appendix) was developed which assesses how participants felt on the current day compared with the previous day. The four domains assessed were perceptions about: 1) speech in general, 2) stuttering; 3) communication environments; and 4) interlocutor stance in speaking situations.

The data from the Daily Questionnaire were used to assess the underlying relationships between reports of daily experiences, emotional lability and experienced quality of life. In particular, the relationships between events on one day and how the participant felt about his or her stuttering on the following day were assessed.

Methods

All methods were approved by the UCL Research Ethics committee with the project ID number 1403/001.

Participants

Nineteen German children and adolescents who stutter aged between 9.0 years and 17.7 years (M=13.10 years, SD=2.8 years) participated in the study. There were 13 boys and six girls. Each participant was diagnosed with stuttering by his or her referring doctor and by the first author, a native German speaker and speech language pathologist a certified stuttering specialist (ivs) (a national board certification for fluency disorders in Germany). Stuttering severity was assessed as being between mild and very severe using a translation of version three of the Stuttering Severity Instrument (SSI-3) [21]. Information for each participant with regard to gender, age, and stuttering severity before treatment is given in Table 1. The children and adolescents participated in a residential three-week intensive therapy treatment. The concept behind the therapy was based on a combination of a stuttering-modification approach and fluency shaping techniques. During this intensive therapy course [22,23,24], components of the stuttering modification therapy according Van Riper were combined with speech-techniques which focused on speech rhythm and getting participants to produce sounds with soft onsets [25,26], and awareness-exercises [22]. One-on-one sessions were provided in addition to the aforementioned group therapy. During the first week of the intensive phase, identification and analysis of fluent and stuttered speech took place. The goal of the subsequent desensitization phase (week 2) was to desensitise against negative emotions towards talking and stuttering. During the modification

phase (week 3) different methods for altering current stuttering behaviours were introduced, such as pull-out [24] or speech techniques focusing on speech rhythm and soft onsets [25]. As a residential program, the participants and the therapeutic team spent time together during therapy and for the remainder of the day. Besides the therapy intervention, other daily activities, for example morning sports, evening entertainment (improv theater, game night, movie night etc.) were offered. During the three-week program, several field trips took place to transfer the newly learned skills into the "real world". This intensive therapy provided maximum opportunity for generalization of skills from therapy situations to leisure time. Additionally, the children and adolescents could see that they are not alone with their stuttering, and they could motivate and help each other to deal with it.

Number	Gender	Age (years.months)	Stuttering severity
1	Female	14.2	17
2	Female	17.7	41
3	Male	17.3	22
4	Male	10.4	30
5	Female	13.0	7
6	Female	16.11	27
7	Male	13.5	28
8	Female	14.2	7
9	Male	11.10	33
10	Male	12.2	30
11	Male	17.2	26
12	Male	16.3	25
13	Female	13.3	33
14	Male	15.10	16
15	Male	15.4	17
16	Male	9.1	17
17	Male	14.11	24
18	Male	11.2	32
19	Male	9.0	29

Table 1: Gender, age and stuttering severity before treatment measured with SSI-3 of all participants.

Instrument to assess day-to-day changes: The daily questionnaire

Development: The Daily Questionnaire was designed to collect information about the participants' perceptions towards their stuttering. The Daily Questionnaire contained 25 questions each of which was assessed according to a six-point Likert scale format (Figure 1). Each question required participants to assess how they currently felt about some aspect relative to the day before. The questions were arranged in four sections: (A) General information about speech (four items); (B) Feelings about stuttering (six items); (C) Different speaking situations (nine items); and (D) Impact of stuttering on their life (six items). A pilot study was completed to determine readability among the targeted age demographic and how long it takes to complete the questionnaire. The Daily Questionnaire was given to ten children and adolescents who stuttered between the ages of 9.11 years and 17.11 years. An exit survey about participants' experiences was given to pilot

study participants, which inquired about their perceived readability and duration of taking the survey. Results of that survey revealed that the pilot participants ranked the Daily Questionnaire as easy to understand, and the survey takes approximately five minutes to complete. Data from these participants were not included in the subsequent analysis.

Scoring procedure: Each of the 25 questions received a score of between 1 and 6 on the Likert scale (points indicated in Figure 1). Questions A1 to A4, B3, B5, B6, C1, C3 to C6, C8, and D1 to D6 were scored as follows: Strongly agree = 1, Agree=2, Somewhat agree=3, Somewhat disagree=4, Disagree=5, Strongly disagree=6. Questions B1, B2, B4, C2, C7, and C9 were rated in reverse (e.g. Strongly agree = 6, and Strongly disagree=1). The valence was changed because the questions in the first group were indications of positive affect, and those in the second group were indications of negative affect. The total raw score for a participant was obtained by adding up responses to all items, resulting in scores between 25 and 150; high scores indicate more negative perceptions toward stuttering; conversely, lower scores are indicative of less negative affect.

Procedure

Copies of the questionnaire were distributed to the group of 19 children and adolescents who stuttered every evening after the therapy sessions and the participants completed them on their own in a quiet room. Investigators noted that the three youngest children took approximately 10 extra minutes to complete the Daily Questionnaire; thus, speech language pathology students read the questions aloud and allowed the children to point to responses for the next 18 out of 19 survey days. Per investigator judgment, and per statement of the three participants, they did not have a problem interpreting the questions; throughout the study, the three youngest participants provided relevant, consistent responses to questionnaire items and verbal comments regarding questionnaire responses indicative of understanding. For example, when answering question C3, a child said, "I am picking 'agree,' because I raised my hand to answer a question during group today. I haven't felt confident enough to do that before. All 19 participants completed the Daily Questionnaire on 19 successive days. This resulted in a total of 361 datasets.

Results

Distribution of scores

Analyses of the 361 questionnaires showed that the data were slightly positively skewed (Figure 2) with a skewness coefficient of +0.354. The positive skew is typical with such measures, as most people answer that they feel fine about the issues they are interrogated about.

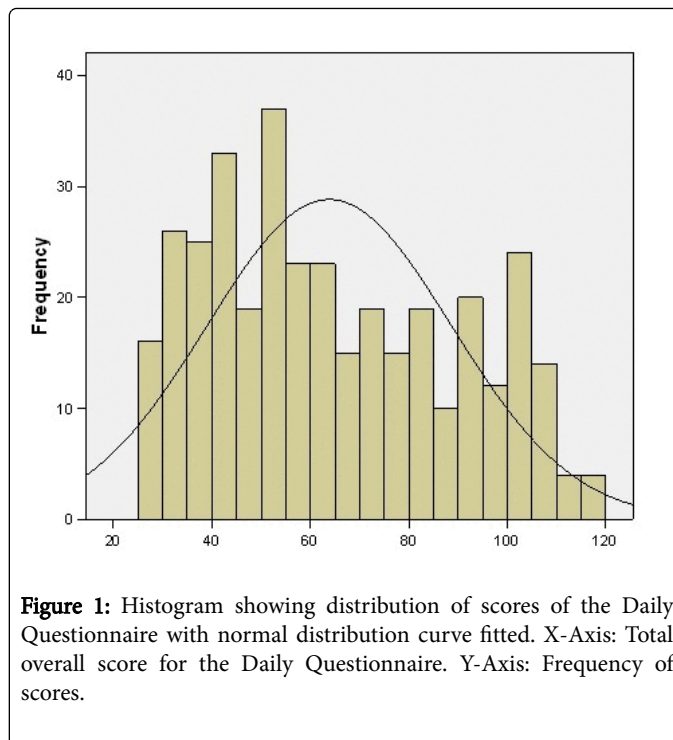


Figure 1: Histogram showing distribution of scores of the Daily Questionnaire with normal distribution curve fitted. X-Axis: Total overall score for the Daily Questionnaire. Y-Axis: Frequency of scores.

Reliability

Internal reliability was assessed using Cronbach's α , and the value was 0.920. A value of α between 0.7 and 0.8 is an acceptable value for internal reliability [27]. Kline noted that when dealing with psychological constructs, even a value below 0.7 is acceptable if the construct being measured includes diverse components [28]. The item-total statistics given in Table 2 showed whether removing an item improved the overall reliability of the scale. Alpha increased when questions B1, B2, B4, C2, C7, and C9 were removed. However, overall reliability did not increase significantly when these questions were taken out. Consequently, these questions were retained. Cronbach's α was 0.921 for subscale A (general perceptions about stuttering), 0.580 for subscale B (feelings towards stuttering), 0.761 for subscale C (different speaking situations) and 0.899 for subscale D (impact of stuttering). Cronbach's Alpha for subscale B was poor, which might be due to the fact that some of these questions were not applicable every day, for example, question B3 and B6 both provide a double-statement, "When I think about my stuttering today, I feel less anxious/embarrassed than yesterday/not anxious/embarrassed at all." Overall, the internal reliability calculations confirmed that the Daily Questionnaire had good reliability. A test-retest-reliability measure was not carried out because the questionnaire was designed to assess daily changes.

Validity

Content validity: A comparison was made between the Daily Questionnaire and The World Health Organization's (WHO) "International Classification of Functioning, Disability and Health" (ICF, WHO, 2001) in order to assess content validity [29]. The ICF looks at health-related experiences of the individual at multiple levels that represent a person's abilities and experiences [8]. The ICF focuses on function and disability along the four dimensions "Body Functions

and Body Structure', 'Activity and Participation', 'Environmental Factors', and 'Personal Factors'.

they felt bad). After z-transformation each child's scores were located around the common mean.

α if item deleted

A1	0.915
A2	0.913
A3	0.914
A4	0.915
B1	0.921
B2	0.922
B3	0.917
B4	0.927
B5	0.915
B6	0.917
C1	0.913
C2	0.922
C3	0.913
C4	0.915
C5	0.912
C6	0.913
C7	0.927
C8	0.914
C9	0.928
D1	0.918
D2	0.914
D3	0.912
D4	0.914
D5	0.912
D6	0.912

Table 2: Item-total statistics for the Daily Questionnaire

Together these allow description of fluent speech and dysfluencies, as well as other positive and negative aspects of the experience of fluent and stuttered speech by the person who stutters. A detailed description of a model that displays features of stuttering as a disorder is given in Yaruss and Quesal [8]. All four dimensions in the ICF are addressed in the items of the Daily Questionnaire. The component 'Body Functions' is addressed in questions A1 and A3. The component 'Personal Factors' is addressed in questions B1 to B6, and D4 to D6. The component 'Activity/Participation' is addressed in questions A4, C1, and C3 to C9, D3 and D6. The category 'Environmental Factors' is addressed in questions A4, C2, and D1 to D4.

Factor analysis: Each participant's responses were standardized to that child's own mean and standard deviation by converting them to z-scores (conversion of a distribution of observations into z-scores gives a distribution with a mean of 0 and a standard deviation of 1 according to Field) [27]. Transformation to z-scores eliminates response bias (e.g., participants who always either checked that they felt good or that

Factor analysis was carried out using the FACTOR program of SPSS 13.0 using principal component extraction and Varimax rotation. Factor analysis is a multivariate technique that identifies relationships between a set of observed variables (in this study the questions of the Daily Questionnaire) and whether there is a potentially lower number of unobserved variables called factors [27]. Factor analysis results can be used to reduce the set of variables in the dataset to just those that work. Varimax rotation attempts to maximize the dispersion of factor loadings within factors by trying to load smaller numbers of variable highly onto each factor. This results in more interpretable clusters of factors (Field, 2009).

A scree plot is a graph that displays each factor in a factor analysis (x-axis) against its associated eigenvalue (y-axis) in a descending order. It shows the relative importance of each factor and can help to visually assess which components or factors explain most of the variability in the data [27]. The scree plot for the Daily Questionnaire showed the impact of the components extracted by the factor analysis on the z-score data (Figure 2). The first four factors were deemed to represent the four categories in the Daily Questionnaire. These four factors explained 44.52% of the variance. The rotated component matrix of the z-score data is given in Table 3. High positive values indicated correlation between subsets of questions. For better readability of the table, only the highest scores for each question are reported. Component 1 loaded on the complete subset D and also on the questions B3, B5 and B6. These questions can be summarized as "Impact of others" and "Confidence in dealing with stuttering". Component 2 loaded all of the questions of subset A as well as on the questions C3 and C4. These questions can be summarized as "My speaking abilities in general". Component 3 loaded on questions B1, B2, B4, C5, C6 and C8. This set of questions can be summarised as "Emotions". Component 4 loaded on questions B6, C2, C3, C4, C7, and C9, and can be described as "Specific speaking situations" (see Table 3).

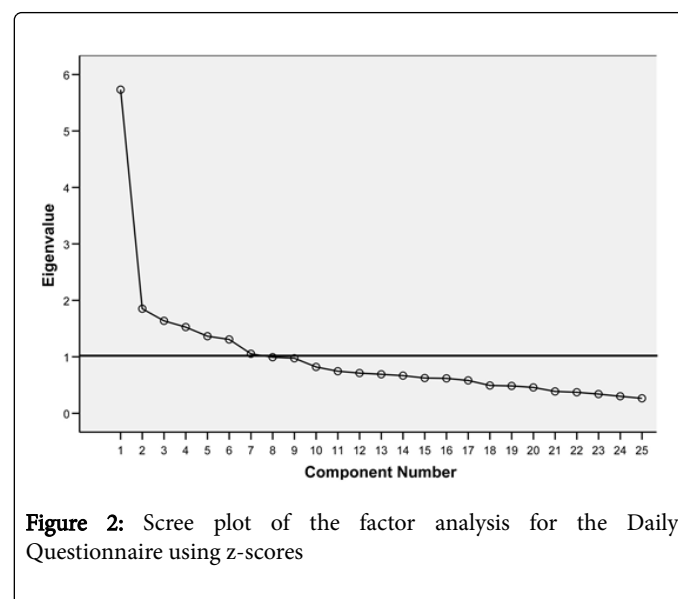


Figure 2: Scree plot of the factor analysis for the Daily Questionnaire using z-scores

The factor analysis suggested that there are four main dimensions that underlie the Daily Questionnaire and the interpretation suggests that these may reflect sub-components of the day-to-day experiences of the children and adolescents who stutter (Impact of other people;

General speaking abilities; Specific speaking situations and Emotions). The relation of factors, categories and corresponding questions of the Daily Questionnaire can be found in Table 4. It is important to note that the factors weight on several items.

	Components			
	1	2	3	4
Z score A1 Speech sounded more natural		.773		
Z score A2 Easier to say exactly what intended to say		.647		
Z score A3 Overall speaking ability is better		.816		
Z score A4 Better application of learned techniques		.711		
Z score B1 More helpless			.507	
Z score B2 More angry or frustrated		.350	.404	
Z score B3 Less anxious	.458			
Z score B4 More isolated			.679	
Z score B5 More self-confident	.612			
Z score B6 Less embarrassed	.472			.454
Z score C1 Avoiding less speaking situations				.510
Z score C2 Let other people talk for me				-.330
Z score C3 Easier to speak to adults		.481		.278
Z score C4 Easier to speak when in a hurry or upset	.301	.417		.313
Z score C5 Easier to speak to someone one-on-one	.322	.278	.426	
Z score C6 Easier to speak to a small group of people	.319	.342	.510	
Z score C7 Harder to speak to a large group of people				-.613
Z score C8 Easier to speak on the phone	.272		.561	
Z score C9 Harder to speak to peers				-.563
Z score D1 Reactions of others were more positive	.468			
Z score D2 I got less bullied /not bullied at all	.557			
Z score D3 Easier to make friends	.562			
Z score D4 More knowledge about how to deal with stuttering	.597	.302		
Z score D5 I feel more brave	.711			
Z score D6 It was easier to make own decisions	.677			

Table 3: Rotated component matrix for the Daily Questionnaire.

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was used next to determine the statistical fit of the factor analysis. The KMO for the Daily Questionnaire was 0.845, which according to Field is a good result (high scores on KMO indicate that the factor analysis was appropriate) [27]. Although factor analysis is useful for understanding the dimensionality and structure of underlying factors, Varimax rotation in particular has the problem that correlations between the factors are forced to zero, which may not be a fair constraint to apply to the actual data, and can make interpretation of results difficult. In interest of not complicating results interpretation and because the factor analysis had identified four factors corresponding to the A, B, C and D items, scores were extracted for each participant individually, on the mean of the four A, six B, nine C

and six D scores, The mean of the A, B, C, and D scores were standardized separately so that scores for each participant had a mean of zero and a standard deviation of one. These scores were then used for the remaining analyses. To avoid confusion, these scores are called zA, zB, zC and zD. The scores of the previous day are called zAp, zBp, zCp and zDp (z-scores relating to the previous day) and the scores of the current day are called zAc, zBc, zCc and zDc (z-scores relating to the current day).

Factor/Component	Category	Corresponding Questions	Description
1	zD	D1-D6, B3, B5, B6	Impact of other people
2	zA	A1-A4, C3, C4	General speaking abilities
3	zB	B1, B2, B4, C5, C6, C8	Emotions
4	zC	C1-C4, C7, C9	Specific speaking situations

Table 4: Overview over factors, categories and corresponding questions of the Daily Questionnaire.

Model of changes in day-to-day experiences of CWS during a three-week treatment

The correlations between zAc, zBc, zCc and zDc and zAp, zBp, zCp and zDp were calculated using multiple regression analysis, which takes the interrelationship between the variables into account [30]. In other words, responses of the current day (zAc, zBc, zCc and zDc) were correlated with the responses of the previous day (zAp, zBp, zCp and zDp). Predictor variables were the factors on the previous day; outcome variables were the factors on the current day. Since each participant had data from nineteen days, there were eighteen current day-previous day pairs. The multiple regressions served two functions: (1) to assess how well these variables together contributed to predicting how a participant felt on the current day and (2) how well each variable on its own (for example “impact of others” or “emotions”) related to how a participant felt on the current day. The analysis used LISREL 8.80 [31] to identify cross-lagged correlations between the four factors between the previous day and the current day. LISREL is a software program that is able to deal with a wide variety of models for the analysis of latent variables. A cross-lagged correlation examined the predictive association between different variables at different time points [32]. In this study the correlation of the four “previous day” factors with the “current day” factors were analysed to assess whether prior everyday occurrences were related to changes of feelings towards stuttering on the current day. The correlation matrix of the correlations between the “previous day” factors (zAp - General speaking abilities, zBp - Emotions, zCp - Specific Speaking situations and zDp - Impact of other people on self) and the “current day” factors (zAc - General speaking abilities, zBc - Emotions, zCc - Specific Speaking situations and zDc - Impact of other people on self) is given in Table 5. Most of the coefficients along the diagonal of Table 5, which are auto-correlations, were significant. These significant correlations revealed that if a participant rated an event high on the previous day, he or she also tended to rate this event high on the current day. This finding of correlations between ratings on back to back days demonstrated that particular correlations between factors persisted across at least a two-day period (i.e. one day lag) for individuals. The authors also looked at longer lags, of two and three days. None of the autocorrelations were significant for three day lags (r=-0.032 for zA; r=-0.032 for zB; r=-0.046 for zC, r=0.002 for zD), and only one (zB - Emotions,

$r=0.104$ [$p=0.049$]) was significant for a two day lag ($r=0.070$ for zA , 0.053 for zC and 0.048 for zD).

		PD Factor 1 zDp Impact of Other People	PD Factor 2 zAp General Speaking Abilities	PD Factor 3 zBp Emotions	PD Factor 4 zCp Specific Speaking Abilities
CD Factor 1 zDc	Pearson Corr. Sig. (2-tailed)	.296** <.001	.087 .107	.062 .254	.037 .498
CD Factor 2 zAc	Pearson Corr. Sig. (2-tailed)	.173** .001	.289** <.001	.108* .046	.068 .212
CD Factor 3 zBc	Pearson Corr. Sig. (2-tailed)	-.066 .226	-.047 .385	.135* .013	-.091 .092
CD Factor 4 zCc	Pearson Corr. Sig. (2-tailed)	.012 .823	.040 .457	.043 .430	-.028 .605

Table 5: Correlations between the factors of the Current Day (zDc , zAc , zBc , zCc) and Previous Day (zDp , zAp , zBp , zCp). ** indicates a significance level of $p<.001$. * indicates a significance level of $p<.05$ PD=Previous Day, CD=Current Day

Significant correlations were observed for the following autocorrelations between the previous day and the current day.

zDp to zDc: the impact of others perceived on the previous day had a highly significant influence on how others were perceived on the current day (Pearson's correlation $r=0.296$, $p<0.001$).

zAp to zAc: the person's own speaking abilities perceived on the previous day had a highly significant influence on how their speaking abilities were perceived on the current day (Pearson's correlation $r=0.289$, $p<0.001$).

zBp to zBc: the perception of emotions on the previous day had a significant influence on the perception of emotions on the current day (Pearson's correlation $r=0.135$, $p=0.013$).

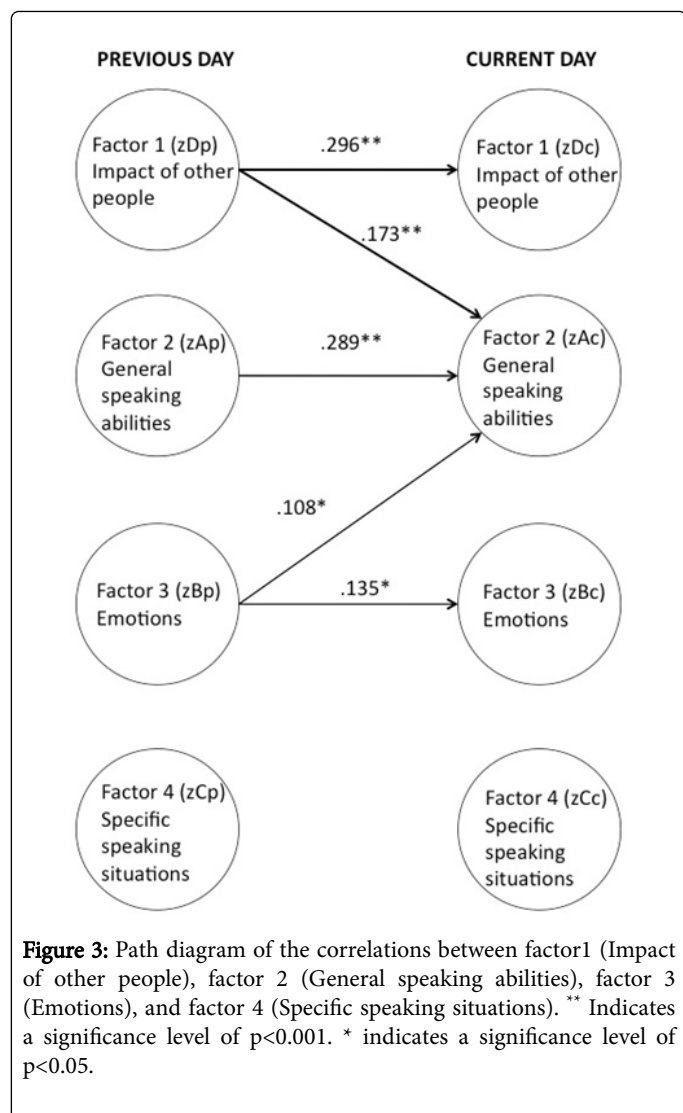
Factor four (zC – specific speaking situations) was not significant, which might suggest that it has a short half-life where half-life is the amount of time that has to elapse before the knowledge about a particular area is superseded. Experiences with respect to specific situations on the previous day did not seem to have a direct influence on how the participant felt in specific speaking situations on the current day.

The off-diagonal correlations, the cross-lagged correlations (which were crossed from one variable to another and lagged in time) are of particular interest for this study, as they show how different factors relate over time [33,34]. These can be used to see if pairs of factors influence experiences in a positive way. A path diagram of the observed correlations between the factor scores on the previous day and the factor scores on the current day is given in Figure 3.

Significant correlations were observed between zDp (Impact of other people on self on the previous day) and zAc (General speaking abilities on the current day). The relation between zDp and zAc showed that the impact of others as perceived on the previous day had a highly significant influence on how their own speaking abilities were perceived on the current day (Pearson's correlation $r = 0.173$, $p = 0.001$). The positive correlation indicated that if this impact was experienced in a positive way, the participant seemed to have more confidence in his or her own speaking abilities on the following day. Furthermore, this correlation also proved to be significant over two

days ($r=0.158$, $p=0.003$), but not over three days ($r=0.041$, $p=0.448$). However given that the autocorrelations for zD and zA were not significant for a two-day lag, this result should be treated with caution.

A significant correlation was observed between zBp (emotions on the previous day) and zAc (general speaking abilities on the current day). This relation showed the perception of own emotions on the previous day had a significant influence on how their own speaking abilities were perceived on the current day (Pearson's correlation $r=0.108$, $p= 0.046$). This correlation was not significant over a two day lag ($r=0.091$, $p=0.095$) or a three day lag ($r=-0.070$, $p=0.198$). Questions loading on the factor "emotions" dealt, for example, with anxiety and feelings of helplessness or isolation. Again, the positive correlation indicated that a more positive perception of own emotions (feeling more in control of own emotions on the previous day) resulted in an individual feeling better about own speaking abilities on the current day. No significant correlations were found between the factor "Specific speaking situations" (zCp or $zCpc$) and any other factors.



Discussion

The purpose of this study was to examine whether daily changes have an effect on how a child or adolescent who stutters perceives his or her own speech on the current day in relation to the previous day. The results need to be assessed bearing in mind that this study was carried out during an intensive stuttering therapy treatment, which itself might have influenced the perceptions regarding daily hassles. A new questionnaire, the Daily Questionnaire was developed to evaluate day-to-day experiences of children and adolescents who stutter during an intensive therapy intervention. It was hypothesized that events occurring on the previous day mediated how participants experienced their speech on the current day. This hypothesis was supported. The cross-lagged panel correlation between the extracted factors revealed a significant relationship between the impact of other people on the previous day and the experience of general speaking abilities on the current day. Further analysis showed that this correlation was also significant over a two-day lag, but not over three days. This suggests that how others were reacting towards the participant and his or her speech on the previous day not only had an influence on how confident the participant felt in terms of dealing with his or her

stuttering on the current day but that this carried on to the following day. Furthermore, a correlation between emotions such as isolation, helplessness and anger towards stuttering on the previous day and experience of own speaking abilities on the current day also occurred. Questions regarding the factor “general speaking abilities” dealt with the naturalness of speech, whether the participant was able to apply his or her techniques and able to say what he or she wanted to say, even in more challenging speaking situations (e.g. being upset or speaking to adults). The findings suggested that on a daily basis during the three-week intensive treatment, reactions of others influenced how a participant experienced their own speaking abilities on the following day. When applying these results to everyday life, a positive or negative reaction of a teacher or classmate could have a long-lasting effect on the child. Therapists, teachers and parents could take advantage of this relationship when working with children and adolescents who stutter by encouraging positive reactions towards their speech and thereby enhancing the child’s confidence in their speaking abilities. A small change such as a positive reaction towards a dysfluency seemed to help the participant to feel more confident about his or her speech and such positive feelings were carried over to the following day.

These results are in agreement with the study of Blood et al. who found that adults who stutter identified more daily hassles than did fluent speakers [19]. 50% of these stressors dealt with communication issues such as speaking performance or dealing with a superior. Blood et al. suggested that it might be possible to alter the “threshold level of annoyance” during therapy interventions, for example, with desensitization exercises, positive self-talk or problem-solving strategies [19]. Findings of the present study showed that experiences of the previous day are correlated with next-day feelings about speech. It could prove to be useful to adapt desensitization exercises, positive self-talk and problem strategies for interventions with children and adolescents.

Limitations and further research

This research was carried out with one group of children and adolescents who stutter participating in a three-week intensive treatment. The participants were aged between nine and 17 years, which is a wide age range with respect to social-emotional development differences between children and older adolescents [35]. Children may perceive and react to their stuttering differently than adolescents. The small number of participants did not allow for a separate analysis with two age groups, however, this is planned for future work.

It would be interesting to investigate day-to-day dependencies in the subjective experience of stuttering in an everyday context, for example when children attend school. The setting of an intensive therapy is a relatively protected environment, and although the participants were confronted with their speech problem constantly, they also had the support of the group. This is in agreement with the study of Hearne et al. with adolescents and young adults who also found that group therapy had a positive effect on participants who wanted to be with people sharing the same interests and problems [11]. The situation may be different when the children go to school, as they may be the only person who stutters and the environment (other students, teachers, different classes) is constantly changing. The day-to-day impact of events may be even more pronounced than in a protected therapy setting. Furthermore it would be of interest to see what impact major events, such as changing schools, or a change in a family situation have on a child who stutter, which could be assessed in a longitudinal study.

In addition, the question could be raised as to whether the reported effects have an impact on speech fluency measures. This could be an indicator of how perceived experiences of stuttering (covert factors) relate to measurable overt behaviour. Such insight would be important as it could help identify a correlation between covert and overt stuttering behavior.

Conclusion

It has been demonstrated that daily experiences mediate feelings towards stuttering in children and adolescents who stutter in an intensive three-week therapy. The Daily Questionnaire assesses these day-to-day experiences, which makes it possible to assess the microstructure of perceptions of children and adolescents who stutter regarding their stuttering.

Appendix

Name: _____ Date: _____

Daily Questionnaire Instruction. For each statement tick the answer that applies to you.

A General Compared to yesterday...	Strongly agree	Agree	Somewhat agree	Somewhat disagree	Disagree	Strongly disagree
1. my speech sounded much more natural today.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. it was much easier for me today to say exactly what I wanted to say, even when I stuttered.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I believe, my overall speaking ability is better today.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I feel that I can apply techniques, I have learned in therapy much better today.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B When I think about my stuttering, today I feel ...	Strongly agree	Agree	Somewhat agree	Somewhat disagree	Disagree	Strongly disagree
1. more helpless than yesterday.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. more angry or frustrated about my stuttering than yesterday.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. less anxious than yesterday/not anxious at all.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. more isolated than yesterday.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. more self confident than yesterday.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. less embarrassed than yesterday/not embarrassed at all.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C Different speaking situations Compared to yesterday...	Strongly agree	Agree	Somewhat agree	Somewhat disagree	Disagree	Strongly disagree
1. I have avoided fewer speaking situations today even when I thought I might stutter more.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I let other people talk for me more often today because of my stutter.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. it was much easier for me today to speak to adults.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. it was much easier for me today to speak when I was in a hurry or upset.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. it was much easier for me today to speak to someone one-on-one.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. it was much easier for me today to speak to a small group of people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. it was much harder for me today to speak to a large group of people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. it was much easier for me today to speak on the phone.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. it was much harder for me today to speak to peers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D Impact of stuttering Compared to yesterday...	Strongly agree	Agree	Somewhat agree	Somewhat disagree	Disagree	Strongly disagree
1. reactions of others towards my stuttering were much more positive today.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I got less bullied today/not bullied at all.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. it was much easier to make friends today	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I believe, I know more about how to deal with my stuttering today.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I felt braver today.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. it was easier today to make my own decisions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 1: Daily Questionnaire.

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