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Modifying stuttering attitudes: Who changes and in what direction?

Modyfikowanie postaw wobec jąkania – kto zmienia swoje podejście i w jakim kierunku?

Abstract: Previous studies show that interventions to improve attitudes toward stuttering yield inconsistent results on the Public Opinion Survey of Human Attributes–Stuttering (POSHA–S). Comparisons of pre- and post-intervention samples indicate that success depends on the percentage of respondents who improved rather than the magnitude of change. A "crossover" effect emerged: respondents with the most positive pre-test attitudes showed lower post-test ratings, whereas those with the most negative pre-test attitudes showed the greatest improvement; respondents with intermediate attitudes showed little change. Similar patterns appeared in non-intervention samples, where one-third fell into positive, minimal, or negative change groups. The study analyzed 943 respondents from 29 intervention samples classified as unsuccessful (U), marginally successful (MS), successful (S), or very successful (VS), plus 345 respondents from 12 non-intervention samples. Using non-intervention data as a baseline, we calculated percentages shifting among the three change groups. In the VS category, interventions moved people from the negative and minimal change groups into the positive change group. In the S category, gains in the positive change group came from the negative change group. In the MS category, all intervention-related changes began in the negative change group, yielding modest growth in the positive and minimal change group. The U category showed shifts into both the positive and negative change group, mainly reducing the minimal change group. These findings suggest that interventions to improve attitudes toward stuttering should apply strategies tailored to individuals in positive, minimal, and negative change groups.

Key words: attitudes, change, intervention, POSHA–S, stuttering

Abstrakt: Badania wykazały, że interwencje mające poprawić nastawienie osób niejąkających się wobec jąkania nie zawsze są skuteczne, co potwierdzają wyniki POSHA–S. Zaobserwowano efekt „krzyżowy": osoby z najwyższymi ocenami w teście wstępnym miały niższe oceny końcowe, a osoby z najniższymi – najwyższe. Podobny efekt pojawił się w próbkach bez interwencji; około jedna trzecia respondentów znalazła się w grupach pozytywnej, minimalnej lub negatywnej zmiany. Analiza 943 z 29 próbek interwencyjnych i 345 z próbek bez interwencji wykazała przesunięcia między grupami. W próbkach bardzo udanych interwencji najwięcej osób przechodziło z grupy negatywnej i minimalnej zmiany do pozytywnej. W próbkach udanych wzrosty obejmowały przesunięcia z grupy negatywnej zmiany. W próbkach częściowo udanych wszystkie zmiany pochodziły z grupy negatywnej. W próbkach nieudanych odnotowano przesunięcia do grupy pozytywnej, jak i negatywnej, co zmniejszało grupę minimalnej zmiany. Wyniki wskazują na konieczność dostosowania interwencji do zróżnicowanych postaw respondentów.

Słowa klucze: postawy, zmiana, interwencja, POSHA–S, jąkanie

FL.2025.13.2.17 s. 3 z 18

Introduction

Background

Since the mid-20th Century, the managing of stuttering in the US has focused on helping adults who stutter become more fluent and learning to deal with negative stereotypes and stigma from the non-stuttering community (e.g., Van Riper, 1973). In the past two decades, the focus has shifted toward achieving a balance between being as fluent as one feels comfortable and, at the same time, placing increasing emphasis on correcting stereotypes and reducing stigma and discrimination in the public sphere (e.g., Bloodstein et al., 2021; Boyle et al., 2016; Langevin & Prasad, 2012; Panico et al., 2018).

The parallel history for managing stuttering in children has reached a similar outcome but began with a primary emphasis on the environment. From the 1940s through the 1960s, treatment was heavily focused on addressing the thoughts and behaviours of parents of stuttering children, due to the widespread acceptance of the diagnosogenic theory of stuttering (e.g., Johnson et al., 1959), which posited that stuttering resulted from parental overreaction to normal disfluencies. As the diagnosogenic theory became increasingly discredited (e.g., Andrews et al., 1983), the treatment of children who stutter shifted towards a combination of promoting fluency and fostering a more informed and supportive home and school environment.

The emphasis on stuttering-related beliefs, reactions, and knowledge among the nonstuttering majority has led to an explosion of studies that have documented – and continue to document – negative attitudes in populations around the world (St. Louis, 2015). The relatively few studies that have attempted to mitigate these negative attitudes have generally produced encouraging, though not entirely consistent, results (e.g., Weidner & St. Louis, 2023; Węsierska et al., 2015).

Weidner and St. Louis (2023) published a chapter serving as "manual" for developing interventions aimed at mitigating negative stuttering attitudes toward stuttering among children or adults who do not stutter. Among the components of their six-step planning process, they recommended understanding the target audience, assessing the audience's attitudes towards stuttering, and understanding principles of attitude change. They outlined the following principles: (a) the intervention must be interesting and meaningful; (b) the word "stuttering" should be used unapologetically; (c) the audience's "cognitive" understanding of both "stuttering" and "person who stutters" should be addressed; (d) the audience's "affective" or emotional reactions to stuttering should be dealt with; and (e) the audience's "behavioural" components or actions in the presence of stuttering and/or a stuttering person must be considered. An appendix in table form summarized 47 different intervention studies that were designed to improve stuttering attitudes. Based on authors' objective or subjective reports, among those who underwent the interventions, outcomes were reported as very positive for 21%, positive for 43%, little changed for 30%, both negative and positive for 2%, both little changed and positive for 2%, and negative for 2%. When control groups with no intervention were involved (10 studies), 80% showed little changed and 20% improved.

Weidner and St. Louis's (2023) list of intervention studies was not exhaustive, but it contained most of the available intervention publications. It also included numerous unpublished reports utilizing the *Public Opinion Survey of Human Attributes–Stuttering* (*POSHA–S*)[1] (St. Louis, 2011; described below in the Method section). The *POSHA–S* measures explicit public attitudes toward stuttering. Researchers around the world have been permitted to use the *POSHA–S* at no cost, provided that they obtained human subject approval from their respective institutions and shared copies of their respondent data with the first author. These data were incorporated into a large and growing *POSHA–S* database, intended to empirically define what could be called "average" attitudes towards stuttering.

Three recent aggregate studies have been carried out using *POSHA–S* pre-test versus post-test data from the international database to better understand why some interventions have been successful and some have not as well as to explore individual differences in stuttering attitudes in pre- versus post-test comparisons after interventions or when no interventions were provided. The three studies featured results from 41 different samples in the *POSHA–S* database: 29 in which an intervention designed to mitigate negative stuttering attitudes was administered, and 12 in which no intervention occurred. The first aggregate study (St. Louis et al., 2020) classified the 29 intervention samples according to changes in three *POSHA–S* summary scores as "very successful" (VR), "successful" (S), "marginally successful" (MS), and "unsuccessful" (U). Discriminant function analysis revealed that the success of intervention samples was predicted partially by three characteristics of the interventions themselves but not at all by demographic characteristics of the 29 samples. The three intervention characteristics were as follows: (a) content that was of interest to or involved the respondents (e.g., the use of humour, personal experience or contact with people who stutter); (b) personal or emotional connections (e.g., feelings associated with stuttering); and (c) information about stuttering that is sufficient, but not overwhelming (e.g., showing videos of people who stutter rather than providing didactic descriptive information and explaining DOs and DON'Ts regarding interacting with people who stutter).

The second study (St. Louis, Aliveto, et al., 2024) explored characteristics of *individual respondents* from the 12 samples of non-intervention respondents who were not exposed to interventions. The samples were pre- versus post-test comparisons of respondents in control groups of intervention studies or assessments of test-retest reliability of the *POSHA–S* (i.e., control or reliability samples [C/R]). With the 345 C/R respondents combined, pre-test and post-test means were nearly identical, and the pre- versus post-test correlation for the overall attitude score was .79, both metrics being indicative of satisfactory test-retest reliability. The respondents were then categorized according to whether their overall attitudes towards stuttering (a) improved from pre- to post-test (*positive changers*), (b) worsened from pre- to post-test (*negative changers*), and (c) remained close to the same from pre- to post-test (*minimal changers*). Two surprising findings emerged, both of which were unexpected by all the investigators of the 12 studies. First, rather than comprising a large majority, only about one-third of the respondents were in the minimal change group, with the remaining two-thirds split quite evenly between the positive changers and negative

[1] The number of respondents in positive and minimal change categories is slightly different from one in St. Louis, Abdalla, et al. (2024) due to reporting data from a preliminary version of the study.

changers. Second, the positive changers had very low scores on the pre-test but very high scores on the post-test, while the negative changers showed the opposite pattern, with very high scores at pre-test and very low scores at post-test. This pattern was termed a "crossover effect," which basically meant that the positive and negative changers cancelled each other out in the pre- versus post-test means. The "regression to the mean" phenomenon (Barnett et al., 2005) was considered because it typically influences post-test scores if pre-test scores are sorted in terms of magnitude. The formula was applied (Trochim, 2025) to determine its effect. The authors concluded that regression to the mean certainly occurred, as it always does when pre-test data are sorted from higher to lower; however, given the high correlation between pre- and post- responses, its effect was negligible.

The third aggregate study (St. Louis, Abdalla, et al., 2024) utilized both the 29 intervention samples and the 12 non-intervention samples. The same success categories of the first study (St. Louis et al., 2020) were utilized for the 29 intervention samples. A total of 480 respondents were in the VR category, 109 in the S category, 92 in the MS category, and 253 in the U category. Then, following the same procedure as in the second study (St. Louis, Aliveto, et al., 2024), each category of respondents was classified as positive, negative, or minimal changers. The 345 non-intervention respondents were included in this third study for comparison with the intervention categories. The findings showed that all four intervention success categories – similar to the non-intervention category in St. Louis, Aliveto, et al. (2024) – demonstrated comparable "crossover" effects between the positive and negative changers, whereas the minimal changers, by definition, remained relatively stable from pre-test to post-test. Moreover, across all the four success categories, the overall score values of the positive changers – similar to those of the non-intervention respondents in the second study – were dramatically lowest at the pre-test and dramatically highest at the post-test. The opposite effect occurred for the negative changers. The *magnitude* of the positive and negative changes was remarkably similar across the categories. What did change as a function of success was the *percentage* of respondents in each category. For example, in the VS category, 75% were in the positive change group, 18% in the minimal change group, and 7% in the negative change group. By contrast, in the U category, 41% were positive changers, 23% were minimal changers, and 35% were negative changers. Importantly, these were similar to the percentages in the C/R category, that is, 36% positive changers, 35% minimal changers, and 30% negative changers. As with the second study, regression to the mean was considered and found to have a minimal effect on the "crossover" effect in the VR group but virtually no effect in the other categories.

Purpose and hypotheses

The striking similarity between the percentages in the change groups in the non-intervention (C/R) and "unsuccessful" (U) categories, and the progressive changes in percentages by category up to the "very successful" (VR) category, appeared to be rule-governed. This suggested that the non-intervention percentages of positive, minimal, and negative changers can be regarded as a baseline for determining the degree of success of various intervention samples. St. Louis, Abdalla, et al. (2024) called for research that explored intervention-induced shifts from one change category to another. Accordingly, the question asked in this

study is "Compared to non-intervention, what are identifiable patterns of changes or shifts in percentages of individual respondents who are positive, minimal, and negative changers, if any, after interventions?"

It was hypothesized that the U category would resemble the C/R category in both the magnitude of change and the distribution of percentages across each change group. It was also hypothesized that the shifts to the positive-changer group in the MS, S, and VS categories would arise equally from the negative- and minimal-change groups as a function of the interventions.

Method

Respondents

We used the same respondents from 41 samples that are described in detail in the previous three aggregate studies (St. Louis et al., 2020; St. Louis, Abdalla, et al., 2024; St. Louis, Aliveto, et al., 2024). All of the studies involved two administrations of the *POSHA–S* (Abdalla & St. Louis, 2014; Abdi et al., 2014; Beste-Guldborg et al., 2015; Bolton et al., 2017; Chandrabose et al., 2010; Flynn & St. Louis, 2009, 2011; Gottwald et al., 2011, 2014; Holcombe & Eisert, 2012; Junuzović-Žunić et al., 2015; Kestenbaum & Khnonov, 2011; Kuhn & St. Louis, 2015; Reichel & St. Louis, 2004, 2007, 2011; Spears et al., 2015; St. Louis, 2012; St. Louis & Enoch, 2012; St. Louis, Lubker, et al., 2009; St. Louis et al., 2010; St. Louis, Przepiórka, et al., 2014; St. Louis, Williams, et al., 2014; Stork & Johnson, 2016; Węsierska et al., 2015). Respondents represented middle school students, high school students, university students studying speech-language pathology or other majors, teachers, other professionals, or the general public. Sample sizes were not large, ranging from 10 to 69, with a mean of 31 respondents. The mean age of the samples ranged from 18.2 to 28.5 years, and mean years of schooling ranged from 11.5 to 25.0 years. The non-intervention samples were obtained from four countries (US, Poland, Kuwait, and Iran), and the intervention samples from six countries (US, UK, Bosnia and Herzegovina, Poland, Kuwait, and India). Most questionnaires were administered in English, but translations were used in Arabic, Bosnian-Serbian-Croatian, Polish, Kannada, and Persian (Farsi). Considering the 41 samples, the percentages for sex ranged from all male to all female but with the average favouring females (mean 27% male to 74% female). Parental and marital status also ranged from 0% to 100%, but the mean percentages for each were 39% and 56%, respectively. The mean relative income (weighted score from −100 to +100) based on comparisons of one's income to that of (a) one's family and friends and (b) all the people in one's country was +8 (range = −20 to +47). Additional demographic details are provided in the three previous aggregate studies (St. Louis et al., 2020; St. Louis, Abdalla, et al., 2024; St. Louis, Aliveto, et al., 2024).

Instrument

The data in this study were *POSHA–S* summary results, notably the Overall Stuttering Score (OSS). The OSS is the mean of two subscores, Beliefs and Self Reactions, and these two subscores are the combined means of four components each. For Beliefs, the components include Traits/Personality, Help From, Cause, and Potential; for Self Reactions they include Accommodating/Helping, Social Distance/Sympathy, Knowledge/Experience, and Knowledge Source. Clusters of 39 rated items by respondents are averaged to comprise each of the eight components related to stuttering. In this way, Beliefs, Self Reactions, and the OSS have been regarded as the most representative measures of stuttering attitudes of an individual or of a sample (e.g., St. Louis, 2011, 2015).

The instrument has a general section that compares stuttering to four other "anchor" attributes (intelligent, left-handed, obese, and mental illness). From two of these attributes, an Obesity/Mental Illness subscore is obtained. In addition, other ratings related to health, abilities, life priorities, and other demographics, not considered in this study, have also been shown to possess predictive potential (St. Louis, 2024).

A few demographic and general ratings utilize a 1–5 scale, while all the detailed stuttering items employ a 1–3 scale wherein 1 = "no," 2 = "not sure," and 3 = "yes." All ratings on the *POSHA–S* are then converted to a -100 to +100 scale, and some item ratings are inverted such that higher scores always reflect better attitudes and vice versa.

At the time of this study, the first author had collected and archived *POSHA–S* results of nearly 21,000 respondents from 230 public and professional samples representing 48 countries with translations to 30 different languages. More than 80% of the *POSHA–S* database consisted of respondents who filled out the instrument once. Also, more than 3,000 respondents from 55 different pre versus post comparisons filled out the *POSHA–S* two or more times to assess test-retest reliability of the instrument or as no-treatment control groups in studies wherein various interventions were employed to improve public attitudes.

In 36 of the pre and post samples, the standard *POSHA–S* was administered; in six samples, an earlier version of the instrument was given, which featured 1–9 scales on all ratings in the demographic, general, and detailed stuttering sections (i.e., the *POSHA–E2*, St. Louis, 2012). Importantly, every respondent filled out exactly the same questionnaire pre and post. Also, all analyses were based on the differences between pre and post ratings – not absolute values of *POSHA–S* mean ratings. Thus, the results from all 41 samples have been regarded as entirely comparable (St. Louis, Abdalla, et al., 2024).

Sorting of samples for success and sorting of respondents for change

Figure 1 describes the two sorting procedures. First, the 29 intervention samples containing a total of 934 respondents were first sorted into four categories of success by evaluating the extent to which there was change in sample means from pre to post for Beliefs, Self Reactions, and OSS, as in St. Louis, et al. (2020). If there was at least a 5-unit improvement in the converted mean rating in all three of these, the sample was termed "very successful" or VR. If two of the three resulted in at least 5-unit improvements, that sample was regarded as "successful" (S). One of three with a positive change of at least five

units resulted in “marginally successful” (MS), and none of the three changing positively by at least five units was “unsuccessful” (U). For example, assume a sample had mean pre-scores for Self Reactions = −2, Beliefs = +20 and OSS = +9 and post-scores for Self Reactions = +4, Beliefs = +30, and OSS = +17. For this sample, Self Reactions improved by four units, Beliefs by 10 units, and OSS by 8 units, placing this sample in the Successful (S) category, wherein two of the three measures increased by ≥5 units.

Figure 1

Schematic of two sorts, one according to success of intervention samples in improving stuttering attitudes, and one according to direction of change from pre to post in intervention and non-intervention samples.

Unsorted Samples	Intervention												Control / Reliability		
Samples	29												12		
Respondents	934												345		
Sorted by Mean Sample Change Pre to Post	Very Successful (VS)			Successful (S)			Marginally Successful (MS)			Unsuccessful (U)			Control / Reliability (C/R)		
Samples	15			3			4			7			12		
Respondents	480			109			92			253			345		
Sorted by Individual Change Pre to Post	Positive Changers (+)	Minimal Changers (0)	Negative Changers (–)	Positive Changers (+)	Minimal Changers (0)	Negative Changers (–)	Positive Changers (+)	Minimal Changers (0)	Negative Changers (–)	Positive Changers (+)	Minimal Changers (0)	Negative Changers (–)	Positive Changers (+)	Minimal Changers (0)	Negative Changers (–)
Respondents	359	86	35	56	37	16	37	33	22	112	55	86	123	119	103

Note. This figure also appears as Figure 1 in St. Louis, Abdalla, et al. (2024).

Next, the individual respondents in all 29 intervention samples and 12 C/R samples were sorted according to the amount and direction of change from pre-test to post-test (St. Louis, Abdalla, et al., 2024; St. Louis, Aliveto, et al., 2024). In this sorting, the respondents whose OSS improved by at least five units (≥ +5) were regarded as positive changers, those whose OSS worsened by at least five units (≤ −5) were negative changers, and those whose post OSS scores were less than five units better or worse than their pre scores (< +5 and > −5) were minimal changers. As explained in the Introduction, respondents in both the C/R category and all four intervention categories (VS, S, MS, and U) demonstrated the "crossover" effect (St. Louis, Abdalla, et al., 2024; St. Louis, Aliveto, et al., 2024). Examples for the second sorting would involve individual respondents. Assume that a respondent’s OSS at the pre-test was +2 and at, the post-test, was +21. With a difference of +19, this person would be a positive changer. Similarly, a person who, at pre-test, had an OSS of +45 and, at post-test, of +23, would be a negative changer, with a difference score of −22. A respondent who changed from +19 to +16, or a difference of −3, would be a minimal changer.

Analyzing for shifts

After carrying out these individual respondent sorts for both intervention and C/R categories, the percentage of positive, minimal, and negative changers were calculated for further comparisons. Using the percentages of C/R respondents as a baseline, this study estimated the effect of interventions in each of the success categories on the percentage of positive, minimal, and negative changers who shifted as a result of the interventions. The authors identified percentages of *shifts from* (or loss of respondents from) various change groups and *shifts to* (or gain in respondents to) other change groups within each intervention category. The results are shown in tabular and graphic displays.

Results

Table 1 summarizes the results of the sorting according to change from pre to post detailed in St. Louis, Abdalla, et al. (2024). In all the four intervention categories classified according to success of improving OSS scores, as well as the non-intervention category, positive changers improved by 15 to 23 units on the –100 to +100 scale. Negative changers worsened by 13 to 18 units, and minimal changers were virtually the same (0 to 1 unit difference). The increasing percentages of respondents in the positive change groups from the U to VS categories and the corresponding decreasing percentages in the negative change groups best explain the progressive overall mean OSS changes from unsuccessful to successful.

Table 1

Mean Overall Stuttering Scores (OSSs) for all respondents in each category; means of respondents who were positive, minimal, and negative changers, and percentages of respondents in each change category[2]

Category	Number of Respondents	Mean Change All Respondents Pre to Post	Positive Changer Difference from Pre to Post	Minimal Changer Difference from Pre to Post	Negative Changer Difference from Pre to Post	Percent Positive Changers	Percent Minimal Changers	Percent Negative Changers
C/R	345	+1	+15	0	–16	35.7	34.8	29.6
U	253	0	+16	0	–19	44.3	21.7	34.0
MS	92	+4	+18	0	–14	40.2	35.9	23.9
S	109	+8	+19	0	–14	51.4	33.9	14.7
VS	480	+16	+23	+1	–14	74.8	17.9	7.3

Note. C/R – control/reliability; U – unsuccessful; MS – marginally successful; S – successful; VS – very successful

[2] The difference values and percentages are slightly different in St. Louis, Aliveto, et al. (2024) and St. Louis, Abdalla, et al. (2024) due to a calculation error.

With the percentages in Table 1 in the C/R category as a baseline, Table 2 shows hypothesized "shifts" or intervention-induced changes in the percentages of positive, minimal, and negative changers within each intervention category. Minus values indicate *shifts from* (or loss of respondents from) the change groups identified in the rows, while plus values indicate *shifts to* (or gain in respondents to) the various change groups.

Table 2
Shifts in percentages of respondents in each change category (positive changers, minimal changers, and negative changers) for the four intervention categories compared to the Control/Reliability [C/R] category

Category	*POSHA-S* Rating	Change Group	Percentage Shift in Change Group Compared to C/R Category
U	OSS	Positive changer	+9
U	OSS	Minimal changer	–13
U	OSS	Negative changer	+4
MS	OSS	Positive changer	+5
MS	OSS	Minimal changer	+1
MS	OSS	Negative changer	–6
S	OSS	Positive changer	+16
S	OSS	Minimal changer	–1
S	OSS	Negative changer	–15
VS	OSS	Positive changer	+39
VS	OSS	Minimal changer	–17
VS	OSS	Negative changer	–23

Note. [U] – unsuccessful; [MS] – marginally successful; [S] – successful; [VS] – very successful

For example, in the first three rows of Table 2, which identify OSS shifts within positive, minimal, and negative changers in the Unsuccessful category, the shift amounts were calculated as follows. Both the positive and negative changer groups show larger values in Table 1 than those in the C/R category. Accordingly, by subtracting the lower scores of the C/R category from the higher scores of the Unsuccessful category, the resulting gains or *shifts to* were +9% for the positive changers and +4% for the negative changers. These together account for the –13% loss or *shifts from* the C/R category.

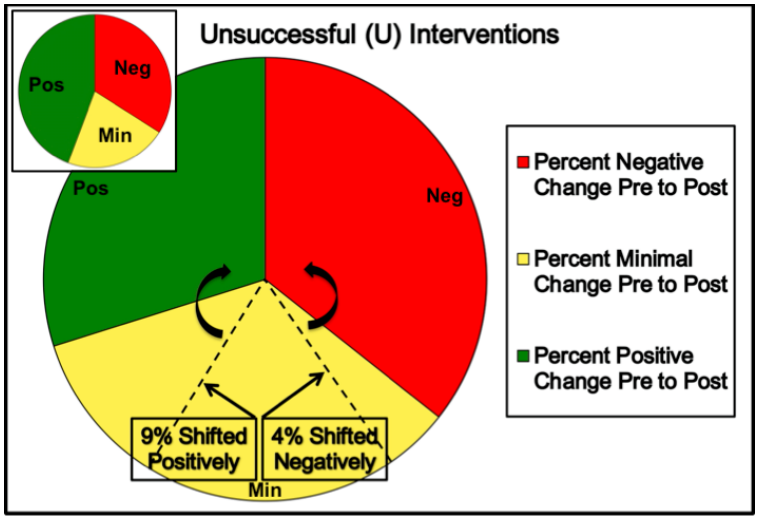
Figures 2–5 graphically display these percentages for OSS, where green indicates positive changers, yellow represents minimal changers, and red – negative changers (these are also indicated, respectively, as "Pos," "Min," and "Neg" text.) The larger pie graph's colours depict the profile of the baseline C/R category (similar to the graphic in St. Louis, Aliveto, et al., 2024), whereas the smaller pie graph insets depict the actual percentage profiles of the four success categories (St. Louis, Abdalla, et al., 2024). Dotted lines show the sources and destinations of the hypothesized shifts (losses and gains), and arrows show the direction

FL.2025.13.2.17 s. 11 z 18

of shifts in the C/R profile to achieve the actual profile in the inset for each figure. In other words, the larger graphs show the origin percentages along with hypothesized changes (shifts) required to reach smaller graphed destination percentages.

Figure 2

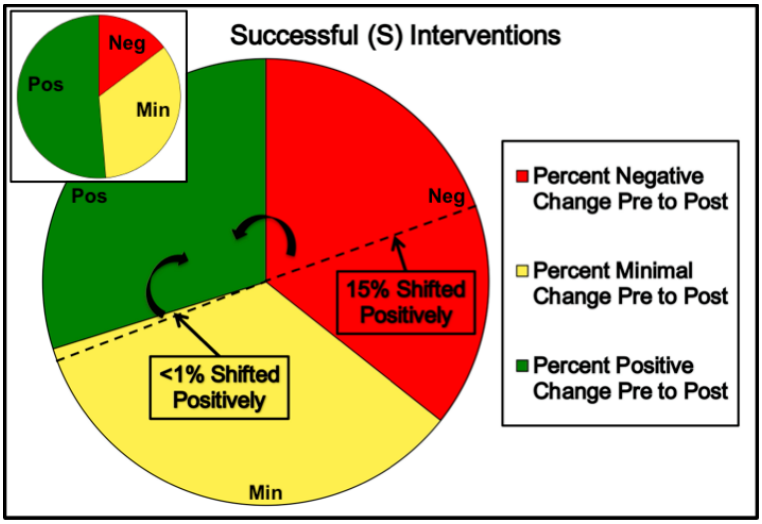
Percentage profile of respondents who shift positively, minimally, and negatively in the Unsuccessful intervention category (shown in the inset) compared to the Control/Reliability (C/R) category profile with hypothesized percentages of shifts related to interventions



Note. (Pos) – positively; (Min) – minimally; (Neg) – negatively; (U) – unsuccessful

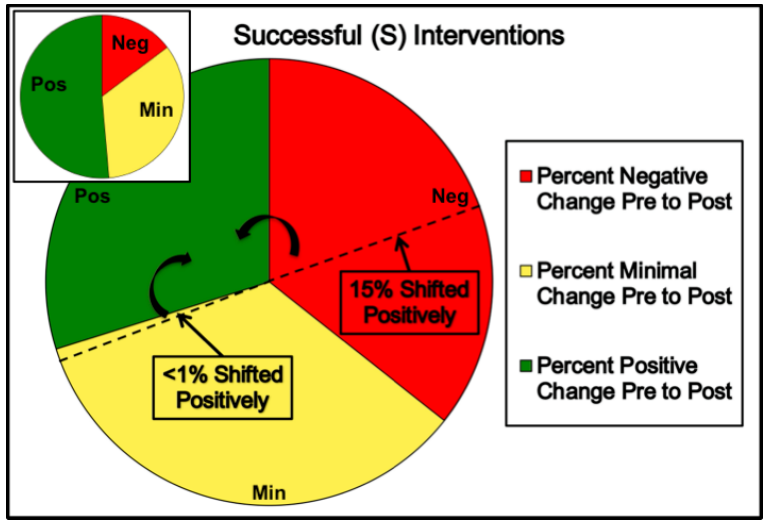
Figure 3

Percentage profile of respondents who shift positively, minimally, and negatively in the Marginally Successful intervention category (shown in the inset) compared to the Control/Reliability (C/R) category profile with hypothesized percentages of shifts related to interventions



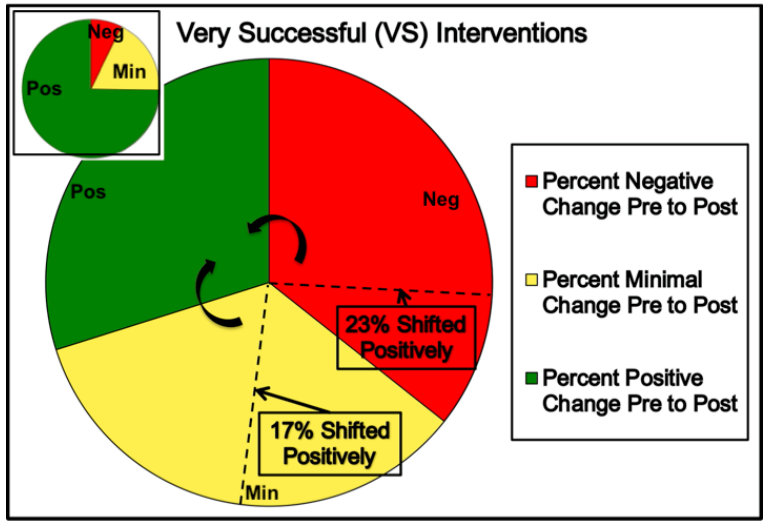
Note. (Pos) – positively; (Min) – minimally; (Neg) – negatively; (MS) – marginally successful

Figure 4
Percentage profile of respondents who shift positively, minimally, and negatively in the Successful intervention category (shown in the inset) compared to the Control/Reliability (C/R) category profile with hypothesized percentages of shifts related to interventions



Note. (Pos) – positively; (Min) – minimally; (Neg) – negatively; (S) – successful

Figure 5
Percentage profile of respondents who shift positively, minimally, and negatively in the Very Successful intervention category (shown in the inset [See Fig. 6]) compared to the Control/Reliability (C/R) category profile with hypothesized percentages of shifts related to interventions



Note. (Pos) – positively; (Min) – minimally; (Neg) – negatively; (VS) – very successful

Using this logic, Figure 2 illustrates that hypothesized shifts of OSS in the U category all came from the minimal change group, 9% positively to the positive change group, and 4% negatively to the negative change group. For the MS category, Figure 3 shows a positive shift of 5% from the negative change group and a 1% shift to the neutral group. Similarly, in the S category, all the shifts originated from the negative change group, with 15% moving to the positive change group and less than 1% to the minimal change group, as shown in Figure 4. Figure 5 illustrates that most (23%) of the negative change group shifted to the positive change group, as did about half (17%) of the minimal change group.

Our hypothesis that the U category would resemble the C/R category was mostly supported, but fewer U respondents were in the minimal change group than for the C/R respondents. Additionally, the hypothesis that gains in the MS, S, and VS categories would be offset by losses about equally from the minimal and negative change groups was only partly supported. This occurred most evenly in the U category, which the authors had assumed would more closely resemble the C/R category. Otherwise, the only other category receiving respondents from both minimal and negative categories was the VR category. For the MS and S categories, nearly all the shifts came from the negative change groups.

Discussion

Summary

This study is a follow-up to three previous aggregate studies of individual and sample mean changes in pre- versus post-test Overall Stuttering Scores (OSSs) from the *POSHA–S* stuttering attitude instrument. It lays out a strategy in which a non-intervention average can be used to estimate important differences that explain degrees of success of interventions designed to improve attitudes. It is important to remember that it was clearly the *percentage* of respondents who were in the positive changer group rather than the *magnitude* of changes in any of the three groups that determined the extent to which interventions were successful (St. Louis, Abdalla, et al., 2024). The current study takes this important finding a step further and shows where those percentages most likely came from. For example, if the percentage of positive changers increased from the non-intervention (C/R) level of 36% to the very successful (VR) intervention level of 75%, where did the "added" approximately 40% come from? Did they come from the minimal changers, negative changers, or both? The answer, shown in Table 2 and Figure 5, was "both," that is, 23% came from the potential negative changers and 17% from the potential minimal changers. In other words, something in the VR interventions affected both of these groups in the desired direction. It is worth recalling, however, that most of the "original" 36% had begun with the lowest pre-test scores (St. Louis, Abdalla, et al., 2024; St. Louis, Aliveto, et al., 2024). Progressing in the direction from more to less successful interventions, the successful (S) interventions most likely affected mainly the potential negative changers, shifting 15% of them to positive changers and less than 1% from the minimal change group to positive changers. The marginally successful (MS) intervention category was actually the most

similar to the non-intervention (C/R) category: 5% of potential negative changers shifted to positive changers, and 1% shifted to minimal changers. Interventions in the unsuccessful (U) category – with an overall mean difference between pre-test and post-test OSSs near zero, like the C/R category – reduced the potential minimal change category by 13%, with 9% shifting to the positive changers and 4% to the negative changers.

To the extent that this strategy yields a valid picture of what actually occurred in the minds of respondents subjected to interventions, the good news is that most of the intervention-induced changes were in the desired direction. Except for a 4% shift from minimal to negative in the *U* category, all other shifts moved toward more positive (or less negative) groups.

Implications

What are the implications of these findings? Like previous reports (e.g., Abdalla, 2015; St. Louis et al., 2020; Weidner & St. Louis, 2023), the authors contend that reducing public stereotypes and stigma toward stuttering is not a simple process of providing accurate information about the condition. For an effective change in attitudes to occur, recipients of interventions need to be open to new insights and willing to entertain new ways of behaving (Abdalla & St. Louis, 2014; Flynn & St. Louis, 2011; St. Louis et al., 2018), the interventions must be touching and engaging with the relevant – but not overburdening – information (St. Louis et al., 2020; Weidner & St. Louis, 2023).

Our results, in concert with the findings of St. Louis, Abdalla, et al. (2024), point the way to new experimental designs in reducing negative stuttering attitudes in the non-stuttering population. They strongly support subjecting people with relatively positive, neutral, or negative attitudes to *different* interventions. Assuming that most people with negative attitudes would improve their attitudes spontaneously after thinking more about stuttering (i.e., from filling out the *POSHA–S* or another scale), it might be most advantageous to simply let them know that stuttering is not as serious a problem as many people initially believe it to be. Those with positive attitudes, who otherwise would likely come to believe that stuttering is a more serious problem than they first thought, might be encouraged to stick with their first impressions. They could be informed that first impressions are usually correct. Those with intermediate attitudes would most likely benefit from educational interventions that help them learn more about stuttering and how best to interact with people who stutter.

When interventions within each intervention category were considered, St. Louis et al. (2020) wrote:

> [...] Successful interventions to improve public attitudes toward stuttering are likely to (a) be captivating and interesting to the target audience, (b) deal with material that has meaning to the audience, and (c) contain sufficient information about the disorder. Conversely, unsuccessful interventions are likely to be less captivating and interesting, contain material that is dry or difficult to grasp, and contain either insufficient or excessive information. (St. Louis et al., 2020, p. 14)

We tentatively speculate that intervention content that is captivating or interesting may be what might be responsible for the positive changers, while material that is personally meaningful to the respondent might be helpful in preventing otherwise negative changers from doing so. Providing solid but not overwhelming information about stuttering might be especially helpful for the otherwise minimal changers. Designing different interventions for these subgroups has promise for achieving better result from interventions.

Strengths and limitations

Arguably, the strongest aspect of the study is the number of intervention respondents (934) and samples (29), and number of non-intervention respondents (345) and samples (12) from multiple countries. Large sample sizes add confidence that findings are robust.

Of course, the diversity of the samples could be regarded as a limitation such that differences in countries or regions have been found to be related to stuttering attitudes (St. Louis, 2024). Arguably, however, the potential confounding that might be inherent from diverse samples is effectively minimized by the fact that differences in pre versus post scores were taken from exactly the same *POSHA–S*s in the calculations.

Another limitation is that the number of samples and total respondents in each intervention category were not equal, ranging from 3 to 15 samples and 92 to 480 respondents. Yet, previous pre and post comparisons with the *POSHA–S* typically have had much smaller sample sizes, i.e., 5–105 with a mean of 25 respondents.

The assumption that the baseline (i.e., the non-intervention C/R respondents) was representative of all respondents could be incorrect. If so, the percentage of shifts to or shifts from various categories as a result of interventions would be changed.

Future research

Given that these results are based on the assumption that previous non-intervention pre versus post samples are representative, similar studies should be undertaken to determine if the findings would be replicated in other settings. These could best be carried out with mixed method studies of experimental and control groups from the same regions along with interviews of respondents from each of the change categories to explore why they responded as they did following interventions or after simply repeating the attitude measure.

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