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**The effectiveness of individual and integration
approaches for treated children and adolescents
who stutter:
a systematic review from 1990 to2018**

BY

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Abstract:

Aims To find the reason for limited evidence on the effectiveness of stuttering modification and to compare the effectiveness of available stuttering treatments, particularly the individual and integration approaches by synthesizing the available evidence.

Methods A systematic review of the literature on the individual and integration approaches to treat CWS. Studies published from 1990 to 2018 were reviewed. Searches were not restricted by assessment tools and study design ,but were limited by participant characteristics, treatments (Fluency Shaping (FS), Stuttering Modification (SM) and Cognitive Behaviour Therapy (CBT)) and language.

Results Synthesized evidence from 29 papers identifies that relapsing and the quality of sound after treatment via FS may be the main reasons behind the limited evidence that SM has. In addition, participants treated by integration approaches showed an ability to reduce stuttering and maintain treatment gains for a long period of time as compared to those treated via FS or SM.

Statement of problem The reason for limited evidence supporting stuttering modification is unknown and there has not been systematic review conducted that compares the outcomes of Children and adolescents who stutter (CWS) treated by both the individual and integration approaches.

Implications of this review This review suggests integrating FS with SM alone or with other treatments that may help clinicians assist CWS to meet their goals and maintain their treatment gains.

Keywords: stuttering, systematic review, fluency shaping, stuttering modification, individual approach, integration approach

الملخص باللغة العربية :

هدف هذا البحث إلى التعرف السبب الذي يكمن وراء قلة البراهين التي تثبت فاعلية برنامج تعديل التأتأة وايضا مقارنة افضل الاساليب المتوفرة لعلاج التأتأة والتي تم تقديمها بشكل منفرد أو مدمج، في هذه الدراسة تم مراجعة نتائج الدراسات السابقة (من سنة ١٩٩٠ الى ٢٠١٨) التي استخدمت برنامج علاجي واحد فقط او عدة برامج مدمجة مع بعض لعلاج الاطفال الذين يعانون من التأتأة. ومعايير استبعاد الدراسات لا يتم بناءً على أدوات التقييم ولا على المنهج البحثي للدراسة، ولكن يعتمد على خصائص المشاركين والعلاجات المستخدمة (تشكيل الطلاقة، تعديل التأتأة والعلاج السلوكي المعرفي) واللغة التي تم كتابة البحث بها.

وتظهر الأدلة التي تم جمعها من تسعة وعشرون دراسة أن هناك سببين لقلّة الأدلة الداعمة لبرنامج تعديل التأتأة وهي: الانتكاس وجودة الصوت بعد العلاج ببرنامج تشكيل الطلاقة. وايضاً أظهر المشاركون الذين عولجوا من خلال عدة برامج مدمجة مع بعض قابلية للحد من التأتأة والحفاظ على مكاسب العلاج لفترة طويلة بالمقارنة مع الذين تم علاجهم إما بالبرنامج تشكيل الطلاقة أو تعديل التأتأة.

وتقترح هذه الدراسة الى دمج كلا البرنامجين: تشكيل الطلاقة وتعديل التأتأة أو دمجهما معا مع برامج علاجية اخرى التي يمكن ان تساعد الاخصائيين على مساعدة الاشخاص المتأتين لتحقيق اهدافهم والمحافظة على مكاسب علاجهم.

الكلمات المفتاحية: التأتأة، مراجعة منهجية، تشكيل الطلاقة، تعديل الطلاقة، المنهج الفردي، المنهج المتكامل.

▪ **Introduction:**

Stuttering is ‘a complex disorder of communication, which may encompass not only surface disruption of fluency but also social and emotional elements’ (Baxter et al., 2015, p.677). Stuttering has two types: developmental and acquired stuttering (Ward, 2017). A primary concern of this review is developmental stuttering as it has been found in the literature to appear at two different age level; two to four years old (Blomgren, 2013; Laiho & Klippi, 2007; Ward, 2008), and at late 13 years old (Ward, 2008). Around 5% of children and 1% of adults diagnosed with stuttering; however, around 75% of children recover from this disorder naturally (Blomgren, 2013) with less chance to recover if the child is older than 6 years or the stuttering lasted more than a year (Yairi & Ambrose, 1992).

The main cause of stuttering was not discovered, but there was possibility to be genes-related (Blomgren, 2013). Finally, stuttering has two types of features: overt features including repetitions of either sounds or words, and covert features, involving avoidance of some words (Baxter et al., 2015; Blomgren, 2010, 2013), increased anxiety and decreased social being (Blomgren, 2010, 2013). Thus, clinicians need treatments that can deal with these features.

▪ **Research problem:**

Clinicians can treat Children and adolescents Who Stutter (CWS) by either Parent–Child Interaction (PCI), the Lidcombe Program (LP), Fluency Shaping (FS), Stuttering Modification (SM), or Cognitive Behaviour Therapy (CBT) (Laiho & Klippi, 2007; Menzies et al., 2008; Peters & Guitar, 1991; Ward, 2008). These treatments can be delivered either by the individual approach (CWS treated with one treatment) or the integration approach (CWS treated with techniques from different treatments). Examples of the integration approach include a combination of either CBT with FS, CBT with SM or FS with SM (Blood, 1995; Bothe, Davidow, Bramlett & Ingham, 2006; Salihovikj, Junuzovikj, Zunikj, Duranovikj, Ibrahimagikj & Beganovikj, 2010; Smits-Bandstra & Yovetich, 2003).

In PCI treatment, therapists teach parents to deliver this treatment because it works on adapting the interaction styles between them and their children to increase the chance of fluency. While in LP treatment, parents were taught how to praise their

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children when they speak fluently and encourage them to correct themselves when they stutter. The difference between these treatments is that the PCI adjusts the environment and parent style, whereas in the LP program parents apply the treatment instead of clinicians. According to Ward (2017), preschool and school-aged CWS benefit from these treatments.

The philosophy of FS treatment is that the occurrence of stutter events can be reduced or eliminated by teaching CWS to output speech described as fluent, natural-sounding and to disregard bad attitudes toward stuttering (Blomgren, 2013; Onslow & Menzies, 2010; Peters & Guitar, 1991; Prins & Ingham, 2009; Salihovikj et al., 2010). Stutter-free speech (nearly zero stuttered syllables) is the aim of FS (Prins & Ingham, 2009). This treatment has different methods, including smooth speech, prolonged speech and Gradual Increase in Length and Complexity of Utterance (GILCU) (Laiho & Klippi, 2007) and is used with all people who stutter (Ward, 2017). Nevertheless, SM suggests that elimination of stutter events is not possible and it claims to normalise reactions to those events by training CWS to react to stuttering events calmly (to accept their stuttering). Unlike FS, the target of SM is less effort (Prins & Ingham, 2009). SM treatment which may be suitable for all ages includes Cancellation, pull-out and preparatory-set techniques (Ward, 2017).

The principle of CBT, however, is that cognition can be influenced by both behaviour and emotional reactions and it aims to decrease social avoidance and anxiety. This treatment has several steps: understanding of the issue by the therapist and client; identifying the negative thoughts by the client and re-evaluating thoughts that link to the clients' speech and their stuttering (Blomgren, 2013). Although CBT is often used with adults, children and adolescents can also receive such treatment (Caughter & Dunsmuir, 2017).

In the literature, it has been demonstrated that successful stuttering treatment may show reduced stuttering frequency and its negative impact on daily life, addressing emotional and improving communication skills and self-confidence (Blomgren, 2013; Johnson et al., 2016; Yaruss, Coleman & Quesal, 2012). In 1994, Boberg and Kully reported that prolonged speech (a FS technique) is an effective

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treatment for adolescents and adults due to its impact on reducing the percentage of Stuttered Syllable (%SS). Using this technique, participants' speech was natural, and their %SS reduced from 11.4%SS and 14.8%SS to 1.1%SS and 1.3%SS, respectively, at a 12-month follow-up. Additionally, Block, Onslow, Packman, Gray & Dacakis (2005) studied the performance of experimental individuals (adults and adolescents) who received an FS approach within and outside clinic. The results showed that %SS decreased from 5.4%SS to 1.8 %SS; this result was maintained at a three-and five-year follow-up and the participants demonstrated natural speech with a mean 0.7 in speech naturalness (NAT) (Block et al., 2005). However, these studies neither reported if the treatment reduced the impact of stuttering, nor did they use a control group.

Nye et al. (2013) executed a systematic review and meta-analysis of nine studies for children and adults. Nye et al. compared the effectiveness of the following approaches: LP, speech motor training, Delayed Auditory Feedback (DAF), GILCU, Intensive Smooth Speech (ISS), Electromyography feedback (EMG), Home-based Smooth Speech (HOMESS) and extended length of utterance. The results concluded that studies comparing two treatments did not show significant differences, however, for studies comparing an experimental and control group, the difference between groups is one standard deviation (Nye et al., 2013). However, this review focused on reporting the outcomes of %SS, comparing only some treatment, and the number of studies that they reviewed was low.

Menzies et al. (2008) compared three groups: a group who took CBT before FS, another took FS only and a control group in an experimental clinical trial for adolescents and adults. At a 12-month follow-up, similar results found between each of the experimental groups and the control group, with 3.3%SS and 3.4%SS, respectively. CBT treatment also showed a reduction in anxiety, with no improvement in the fluency, whereas FS alone was not able to reduce anxiety (Menzies et al., 2008). One limitation of this study did not examine the effectiveness of CBT after FS.

In another study,Amster and Klein (2008) investigated the effectiveness of CBT alone for three weeks and combined it with SM for another three weeks to treat adults who stutter. The experimental group demonstrated a significant reduction in

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stuttering severity and improvement in communication attitude after combining CBT with SM; these changes were maintained up to a 15-week follow-up (Amster & Klein, 2008). However, a major problem with this study is that the sample size was small, and it did not have a control group.

Ritto, Juste, Stuart, Kalinowski, & de Andrade (2016) compared a group that received Altered Auditory Feedback (AAF) and another that received integration treatments FS and SM. Participants in this randomized clinical trial were adults. Both groups demonstrated that %SS was decreased and there was no significant difference between the two groups after a six-month follow-up (Ritto et al., 2016). The study just focuses on fluency and did not report if the emotional state was altered or not. None of these studies explored the effectiveness of either approach for participants aged between 6 and 19; thus this review was carried out to fill this gap.

▪ Research question:

1. Does the SM approach provide better outcomes than the FS approach?
2. Does an integrated approach provide better outcomes than FS or SM individually?

▪ Research Questions:

This systematic review describes qualitative and quantitative evidence which aims to identify the reasons for the lack of evidence supporting the effectiveness of SM. Another aim is to evaluate the outcomes of studies that used a combination approach with these applied FS or SM as an individual approach for CWS.

▪ Research Method:

The methodological procedure adopted for this review involved identifying the criteria underpinning all searches for the relevant studies to be included. Those criteria are addressed below.

▪ Timeframe (1990 to present) in which the studies were conducted

Timeframe (1990 to present) in which the studies were conducted The studies needed to have been published between 1990 and the present day. This timeframe was chosen because the extent to which data can be managed in time that the research has. In the last 20 years, there has been a great emphasis on the integration approach

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which was not in the past. Moreover, there are more integration approaches now and since 2000 more focusing in counselling approaches.

Precisely, this review reports on studies where FS, SM, CBT or PCI approaches were conducted. These approaches can be delivered either alone or combined including FS and SM. In the previous chapter, these both approaches were introduced and differences between them were identified. Yet, they can be integrated as there is a common denominator between them .For example, the researcher defines FS and SM as methods used to increase fluency of CWS, but FS applied all the time while SM used when stuttering occurs. FS and SM applied soft glottal onset, which is CWS start their speech with less attention by stretching the first sound. Soft contacts also used by reducing the visible tension between articulator (lips, tongue and teeth). Therefore, it is hard to distinguish between them. SM approach also could be combined with CBT approach because they address feeling, behavior and thought, but they are less effective in reducing stuttering frequency. Thereby, FS approach is suggested to integrate with SM and CBT because it did not address the notion of emotion.

▪ Information sources:

As shown in figure 1(p.14), four electronic databases were searched including Psyc INFO (Ovid), Web of Science, Science Direct and Google scholar. The aim behind using the three data bases is, respectively, to read abstracts, to link to other databases, and to obtain a full text articles. The researcher did not look at other databases because the time to do this review was limited, and studies may be published in many other databases. Therefore, the focus of this research is Google Scholar search engine, as it was likely to generate more comprehensive results; finding more studies of relevance to the current review than could be provided by a single database. The reference section of each included study was examined to identify further studies.

▪ Search parameters:

The total of included studies, mentioned in figure 1, was a result of using a list of a pre-prepared keywords generated before starting the search for relevant articles. This list consisted of the following categories:

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1. Terms for the targeted population “Stuttering”, stutt*, “school age children”, “adolescents”, child*.

2. Terms for treatment: “Fluency Shaping”, “Stuttering Modification”, “Cognitive Behaviour”, “prolong speech”, “smooth speech”.

Terms for integration: Combi*, integra*

▪ **Study inclusion:**

To avoid selection bias and to guide the researcher in identifying the studies to be included in this review, the following inclusion criteria were set out at the beginning. These criteria were addressed below:

1. Participants’ characteristics: Participants in the studies included in this review were those diagnosed as CWS, ranging in age from 6-19 years.

2. Delivery of treatment :The treatments in these studies needed to be FS, SM and CBT, which could be delivered according to an individual or integration approach. An individual approach is where the study participants receive just one of those treatments (FS, SM, or CBT), while the integration approach refers to participants receiving more than one treatment during the treatment period. Integration can either combine FS and SM, FS, SM and CBT, FS and CBT, SM and CBT, or integrate FS and SM with mindfulness treatment.

3. Tool Assessments :Several outcome measures were included in this review. An outline of examples of these measures is summarized as follows:

▪ **Design characteristics**

In order to examine as many studies as possible, the researcher did not look at any particular study design. Therefore, the emphasized studies potentially ranged from those with a descriptive design, such as case studies and cross-sectional studies, to quasi-experimental studies, including studies conducted pre-and post-treatment. Experimental studies were also reviewed, such as randomised controlled trials and classic experimental studies. The period of these studies could be short or long term, and with or without a follow-up period.

▪ **Written language:** The studies needed to be written in English or translated into English.

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- **Exclusion of studies:** Studies were excluded based on the following criteria:

1.Participants’ characteristics: Studies involving participants presented with ‘cluttering’(an additional speech issue) or genetic disorders besides stuttering, including Autism or Down syndrome, were excluded. These disorders have negative impacts on CWS’s speech; for example, the oral cavity’s size of children with Down syndrome was smaller compared to typical children. Regarding the participants’ age, studies with adults or pre-school children as participants were also excluded because those two age-groups were investigated more than the age of CWS in this review

2.Delivery of treatment :When the participants received treatments other than those mentioned previously in section 2.4.2 were excluded. The LP program is an example of such a treatment, which is primarily delivered to pre-school children, who were not then included in this review.

- **Data analysis :**Data obtained from the included studies was analyzed by reporting the percentage of relapse and the degree of naturalness after treatments, and comparing their results based on the following factors:

- 1.Reduced frequency of stuttering, which can be explored by compressing the outcomes of %SS, SPM, SSI and SR.
- 2.Goal achievement and maintaining fluency after the end of the treatment period.
- 3.Examining the impact of stuttering on quality of life and improved self-confidence; which may be observed in the outcomes of CAT, WASSP, FNE, SEA, OASES, ACES, and SESAS – these are standardised client-completed questionnaires.
- 4.Investigating attitudes toward stuttering, which can be obtained through two different standardized questionnaires S-24, and LCB, and completed by the participants.

Results

▪ Retrieving the outcomes of studies:

As shown in Figure 1, above, four electronic databases were searched for related studies to include in this review. This search revealed 2,563 articles from Google Scholar (n = 992), Web of Science (n = 489), ScienceDirect (n = 675) and psycINFO (n = 437). The titles and the abstracts of these articles were evaluated based on the inclusion criteria described on Method section (see section 2.4). After evaluating these studies, 2,472 articles were excluded because they failed to meet the inclusion criteria. A total of 91 full-text articles remained, with 29 articles subsequently been determined as meeting the following inclusion criteria: participants' characteristics, delivery of treatment, assessment tools, design characteristics, and written language.

▪ Outline of included studies

Table 1 provides a brief summary of the 29 studies that met the inclusion criteria for analysis. Of the 29 papers included, 6 out of 29 were used to answer the first question and 13 out of 29 were used to answer the second question. The remaining 29 studies addressed both questions.

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Table 1 : Summary of 29 studies corresponding to the inclusion criteria.

Study	N	Age rang/ mean (Years; months)	Treatment	Diagnoses	Outcomes measured	Design	Languag e
Baumeiste r, Caspar and Herzi ger (2008)	40	9 – 19	SM and FS	Stuttering	%SS	Panel design	English
Blood (1995)	3	14; 2 – 15; 8	FS and CBT	Stuttering	%SS, SSI, SPM, SESAS and S-24	A multiple baseline across subjects	English
Carey et al. (2014)	16	12 – 17	Prolonged speech*	Stuttering	%SS, ACES, NAT and SR.	clinical trial	English
Caughter and Dunsmuir (2017)	4	10; 4 – 14; 11	CBT, SM, FS and communic ation skills	Stuttering	SSI-4 and OASES-S.	Mixed method design	English
Craig and Claver (1991)	-	-	FS	Stuttering	-	-	English
Craig, Hancock and Cobbin (2002)	6	11 – 17	Smooth Speech*, EMG feedback, relaxation and CBT	Stuttering	%SS, SPM, NAT and CAT	Pre-and post- treatment	English
Craig and Hancock (1995)	-	-	FS	Stuttering	Questionn -aire	Self- report design	English
Craig et al. (1996)	97	9 – 14	INTSS, EMG, HOMESS, Control	Stuttering	%SS, SPM and NAT	Controlle d clinical trials	English
Dayalu, Kalinowsk i and Saltuklaro gl (2002)	-	-	FS	Stuttering	-	Discussing article	English
De Nardo (2017)	89	19	SM	Stuttering	SSI, %SS and NAT	Experime ntal study	English
Druce, Debney	15	6 – 8	FS and SM	Stuttering	%SS, SPM,	Case study	English

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and Byrt (1997)					NAT and SR		
Fourlas and Marousos (2015)	2	9; 07 – 10; 11	CBT, SM, FS, PCI and Solution Focused Brief Therapy	Stuttering	%SS, CAT, OASES-S and SR	Case study	English
Fry et al. (2009)	1	16 – 19	FS, SM, CBT and communication skills	Stuttering	%SS, SEA, WASSP and LCB	Single subject study	English
Fry et al. (2014)	3	17 – 18; 10	FS, SM, CBT and communication skills	Stuttering	%SS, SEA, FNE, WASSP and LCB	single-subject experimental design	English
Hancock and Craig (1998)	77	9 – 14	INTSS, EMG, HOMESS	Stuttering	%SS and SPM	controlled clinical trial.	English
Hancock and Craig (2002)	12	11 – 17	Smooth Speech*, EMG feedback and CBT	Stuttering	%SS, SPM, NAT and CAT	Pre-and post-treatment	English
Hancock et al. (1998)	77	11 – 18	INTSS, EMG, HOMESS	Stuttering	%SS, SPM, NAT and CAT	controlled trial	English
Hearne, packman, Onslow and Quine (2008)	13	13 – 19	Smooth Speech*	Stuttering	Recording interview	Survey Study	English
Kordell (2015)	5	9 – 11	SM, FS and Mindfulness	Stuttering	CAT	Pre-and post-treatment	English
Laiho and Klippi (2007)	21	6; 8 – 14; 8	SM	Stuttering	%SS and SR	True clinical settings	English
Langevin and Kully (2003)	1	9	FS	Stuttering	%SS, SR and NAT	Case study	English
Metten, Zückner and Rosenberg	19	9 – 19	FS and SM	Stuttering	SSI and ACES	Pre-and post-treatment	English

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e (2007)							
Murphy, Yarussb and Quesalc (2007)	1	9	FS and SM	Stuttering	SSI-3 and CAT	Case study	English
Ryan and Ryan (1995)	12	7 – 17	DAF, GILCU	Stuttering	%SS and SPM	Multiple groups	English
Salihovikj et al. (2010)	1	11	FS and SM	Stuttering	SPM and SSI-3	Case study	Translat e to English
Senkal and Ciyiltepe (2017)	35	7 – 17	FS	moderate Stuttering	%SS and SPM	Cross-sectional study	English
Smits-Bandstra and Yovetich (2003)	5	9 – 12	CBT and SM	Stuttering	SPM and CAT	A single-participan t design	Translat e to English
Valentine (2014)	2	11; 2 – 11; 3	SM, FS	Stuttering	%SS, SSI, and ACT	Case study	English
Yaruss et al. (2002)	71	13; 1	FS, SM, combing FS and SM	Stuttering	Questioner (self - prepare)	Survey study	English

Note: (*) studies using method of FS; N= number of sample; FS=Fluency Shaping; SM=Stuttering Modification; CBT=Cognitive Behaviour Therapy; DAF= Delayed Auditory Feedback; GILCU= Gradual Increase in Length and Complexity of Utterance; INTSS= Intensive Smooth Speech treatment; EMG= Electromyograph feedback treatment; HOMESS= Home-based Smooth Speech; NAT = speech naturalness; CAT= Communication Attitudes Test; S-24= Erickson S-24 Scale; LCB= The Locus of Control of Behaviour Scale; SEA= The Self-Efficacy Efficacy Scale for Adolescents; OASES = the Overall Assessment of the Speaker’s Experience of Stuttering – School Age; FNE= the Fear of Negative Evaluation; WASSP= Wright and Ayre Stuttering Self-Rating Profile; SR= Stuttering Severity Rating; SPM= Syllable Per Minute; %SS= The percentage of Syllables Stuttered; SSI= The Stuttering Severity Instrument; SESAS= Sell-Efficacy Scale for Adult Stutterers; ACES= Assessment of the Child’s Experience of Stuttering

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- **Quality of the study:** As can be seen from the above Table, the studies used to answer both questions were of assorted designs: six were case studies, three were controlled clinical trials, one was a clinical trial, two were survey studies and three were a single subject study. A panel design was also used in one study, with mixed methods being adopted for one other study, and four papers reporting pre- and post-treatment. Furthermore, the researcher included one study for each of the following designs: true clinical settings, multiple groups, multiple baseline, a cross-sectional study, a self-report design, a discussion article, and an experimental study. This review included studies of different designs to gain more insights about the topic.

In terms of the number of participants in the study samples: four had large samples, ranging from 77-97, while another five used samples consisting of 19-71 participants. Five other papers reported on studies with 12-16 subjects, and eight studies were conducted on samples totaling 2-7 individuals. Finally, four studies were carried out on very small samples (one participant each). Regarding assessment tools, different measurements were implemented across the studies. Thirteen of the studies implemented three or more measures, while nine studies had two measures and five papers reported on the use of just one measure (see Table 1, p.16). Based on the different research studies mentioned above, the number of samples and the assessment tools were different from study to another.

Regarding the length of course and the follow up of articles, twenty-three articles reported outcomes obtained from intensive courses of treatment, ranging from 12 days to 12 weeks, while two articles reported delivery of treatment over long periods. Moreover, the results of nine studies were obtained by comparing groups' performance, while eight studies reported the results of applying a single treatment to individuals who stuttered. Finally, a further six papers compared the participants' performance. In this way, studies were also varied based on course's duration and the outcomes.

- **Ways in which the outcomes of the included studies were reported**

1. Individual approach versus integration approach : The two figures 2 and 3 below illustrate the percentage for the

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selected studies that used integration or individual approach. In Figure 2, FS was used in seven studies (29%) to treat CWS (Carey et al., 2014; Craig et al., 1996; Hancock & Craig, 1998; Hancock et al., 1998; Langevin & Kully, 2003; Ryan & Ryan, 1995; Senkal & Ciyiltepe, 2017). SM approach was only applied in three studies (13%) (De Nardo, 2017; Laiho & Klippi, 2007; Valentine, 2014) while, 14 studies (58%) adopted integration approaches. With referring more specifically, five (36%) integrated FS with SM (Baumeister et al., 2008; Druce et al., 1997; Metten et al., 2007; Murphy et al., 2007; Salihovikj et al., 2010), while nine articles (64%) combined FS and SM with cognitive approaches (see Figure 3).

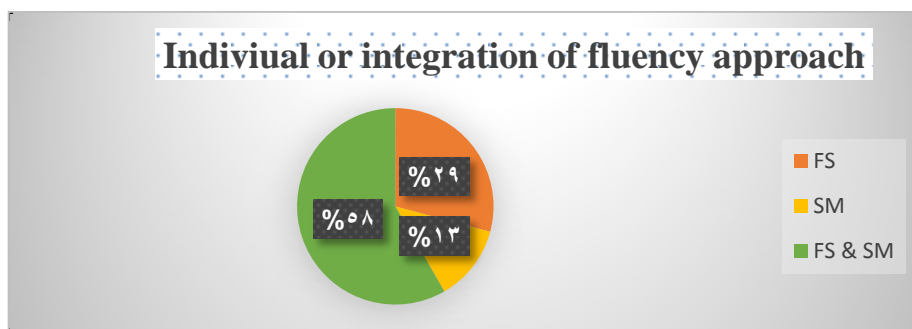


Figure 1. Percentages for the adoption of either individual or integration approach.

Figure 2 gives a description of the integrated approach combining both fluency and cognitive approaches. For example, three studies (34%) combined FS, SM, CBT with communication skills (Caughter & Dunsmuir, 2017; Fry et al., 2009; Fry et al., 2014). Other integration totaled 11%, including FS, SM, CBT, PCI and solution focused brief therapy (Furlas & Marousos, 2015), FS, SM and a mindfulness approach (Kordell, 2015), FS, EMG feedback techniques, relaxation techniques and a CBT approach (Craig et al., 2002) and FS, EMG feedback techniques and a CBT approach (Hancock & Craig, 2002). Moreover, 11% of the studies incorporated FS with CBT (Blood, 1995), while 11% combined SM with CBT (Smits-Bandstra & Yovetich, 2003).

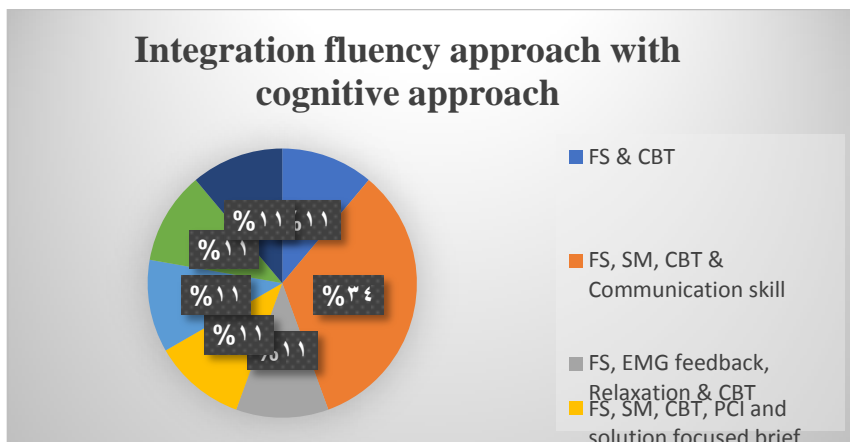


Figure 2. Percentages for the adoption of an integration approach.

2.Limited Evidence to Support the Use of SM Approach

- **Relapse after treatment:**As shown in Figure 3 below, the findings derived from included studies indicated that FS approach to be the most prone to relapse, with 82%, while 18% for not relapse. Although Craig and Calver (1991) reported that 33.3% of their participants relapsed, Craig and Hancock (1995) declared that relapse occurred following the FS approach with a frequency of 73% basis of self-report, which was higher than the percentage indicated by Yaruss et al. (2002). In fact, according to Yaruss et al. (2002) 41.8% of the participants treated using FS demonstrated a relapse in their fluency after the end of the course of treatment. Furthermore, the percentage of relapse for FS alone was often higher than for either SM alone or a combination of both FS and SM (Yaruss et al., 2002). Another study presented by Hearne et al. (2008) demonstrated that relapse occurred after just one week following an intensive course of FS among seven participants. However, these participants stated that the reason for the relapse was not the FS treatment itself, but the participants’ failure to continue practicing its techniques, due to “forgetting to practice, being busy or being self-conscious” (Hearne et al., 2008, p.92). Relapsing occurred more after using the FS approach alone as reported by the findings of the previously mentioned studies.

However, in two studies (Craig & Hancock, 1995; Hancock et al., 1998), the participants’ parents judged their children’s speech after the end of a course of FS, noting that 28.3% and 29% of the

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children, respectively, did not have any experience of relapse. Ryan and Ryan (1995) also examined the rate of relapse after treating one group using DAF, while another group was treated with GILCU-another FS method. Both groups appeared to have maintained their fluency by the 14-month follow-up (Ryan & Ryan, 1995). Another paper also acknowledged that seven out of 14 participants treated via FS had not lost their fluency (less than 1.5%SS) by the one-year follow-up (Carey et al., 2014). Therefore, the FS approach was shown to be effective in maintaining fluency as illustrated above.

30% of FS group showed relapse, as criterion of greater than 2% (Craig et al., 1996; Hancock & Craig, 1998), with three participants in ITNSS group alone and another three participants from both EMG group and HOMESS group had relapsed greater than 5%SS after 12-month follow-up (Craig et al.,1996). The percentage of relapse among children was 53%, but not approach to pre-treatment level, while 13% of them approached this level, as judged by parents after two to six years follow-up (Hancock et al., 1998). In 1995, Blood also reported that three participants treated with a combined FS and CBT approach exhibited relapse, but not approach the grater than 3 %SS during the 12-month follow-up. Following this, two out of six participants re-treated via combination FS, EMG feedback techniques, relaxation techniques and a CBT approach revealed greater frequency of relapse at over 5 %SS (Craig et al., 2002). Likewise, the FS approach, ITNSS, EMG, HOMESS, FS and CBT combined, and FS, EMG feedback techniques, relaxation techniques and a CBT approach combined also showed relapse.

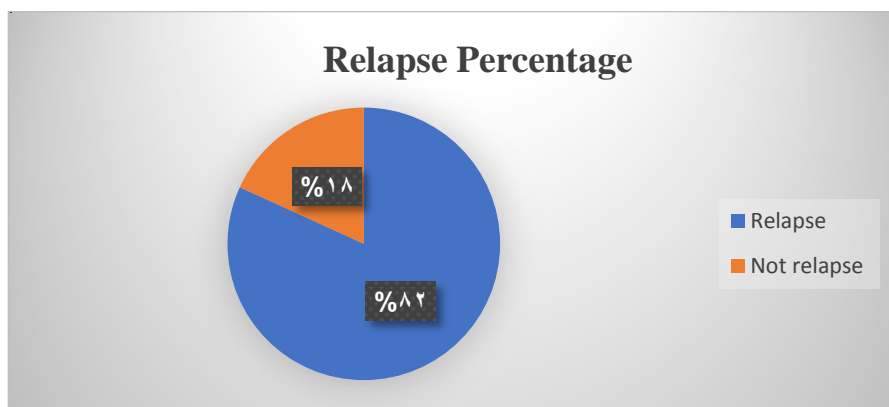


Figure 3. Results of 11 articles concluding the findings for the proportion of relapse in FS.

-Speech Naturalness:The quality of the sound of CWS after treated by FS approach created more debates among therapists which might make SM approach has a lack of evidence. The Figure 5 below presents the results obtained from the NAT rating, which was mentioned in nine of the studies. Two of these studies (22%) reported that the speech patterns of participants treated using FS were ‘unnatural’ (Dayalu et al., 2002; De Nardo, 2017). For instance, the mean for participants treated using FS was rated as 7.01, whereas those who modified their speech using SM were rated as 6.43 as rating by 9-point speech naturalness scale (De Nardo, 2017).

As opposed to the previous studies mentioned in the above paragraph, other studies identified participants’ speech as ‘Moderate’ (close to natural) after the end of the FS course. For example, using a 9-point speech naturalness scale, Carey et al. (2014) found that the experimental group scored 3.8 compared to the control group whose score was 3.1. In another study conducted by Craig et al. (1996), the mean of the all groups as rated by parents and clinicians was 3.47 and 3.69, respectively. Similarly, parents and clinicians at a 12-month follow-up rated CWS in all treatment groups as 3.83 and 4.59, while at 2 to 6-year follow-up CWS speech was less natural (3.34 and 4.51, respectively) (Hancock et al.,1998). Those treated using FS were assessed as ‘Very natural’ in a conversation and explanation

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task at four months, although this finding was rated between 2.0 and 3.5 at five months (Langevin & Kully, 2003).

Finally, two studies, which combined FS with another approach, found that there was an increase in the degree of naturalness in speech. For instance, Druce et al. (1997), who integrated FS and SM, revealed improved naturalness in speech, rated at 2.27 immediately post-treatment and 2.67 by 18-month follow-up. Meanwhile, Hancock and Craig (2002) also reported an improvement in speech naturalness to 3.7 and 4.3, respectively, as rated by parents and clinicians after two-year follow-up. Although, one out of six participants showed unnatural speech, four participants increased their rate of speech naturalness, with 4 at two years follow up (Craig et al., 2002). Although participants' sounds unnaturally appeared in some studies, they seemed to be natural as illustrated by some other researchers referred to previously.

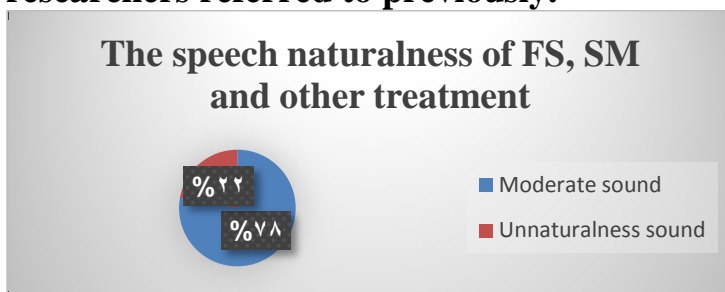


Figure 4. Results of 9 articles concluding the findings for the Speech Naturalness of FS, SM and other treatment.

▪ Investigating Individual and Integration Approaches Based on Four Points

1. **Reduced Frequency of Stuttering:** To demonstrate a decrease in the frequency of stuttering, 23 out of 29 studies were reviewed. These articles were divided into two approaches: an individual approach and an integration approach. The four tools used to measure speech were subsequently reported, where applicable.

- **The Individual approach (pre- and immediately post-treatment):** In nine out of the 23 articles, only one approach was used to try and reduce the frequency of stuttering in CWS. These

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articles report the following approaches: FS or FS techniques (smooth speech, GILCU), and SM. The use of FS was reported in seven of these studies, while SM was reported in two studies. Nevertheless, all the studies revealed a positive effect of FS in reducing the frequency of stuttering using %SS, SR and SSI measurements, with improved speech rates recorded for the use of the SPM tool.

The outcomes of these studies indicated reduced %SS (see Table 2). Finding of %SS in two studies (Hancock & Craig, 1998; Hancock et al., 1998) revealed significantly reduced performance in the mean of all three treatment groups (INTSS, EMG, and HOMESS), with 0.8 %SS, compared to the mean of the control group (Hancock et al., 1998). The findings of %SS among younger group was less than the older group, scoring 0.8%SS and 1.0 %SS, respectively (Hancock & Craig, 1998). Moreover, the experimental groups of clinical trial study were found to have reduced the number of % SS from 6.2%SS to 2.0 %SS (Carey et al., 2014). As opposed to the control group, reduction in the %SS was mostly found in the experimental group who were treated using individual approaches only.

Similarly, Langevin and Kully (2003) who used FS approach reported that the subject of their case study had reduced his stutter to 0.3 %SS in conversation task and 0%SS in reading task. In addition, the group treated using FS technique was found to have decreased the number of %SS to less than 1 %SS within clinic and 1.1%SS-2.0%SS beyond clinic (Ryan & Ryan, 1995). A study presented by Senkal and Ciyiltepe (2017) revealed reduction in the outcomes of %SS in both within word and between word after using FS approach. Laiho and Klippi (2007) also demonstrated that %SS was reduced from 4.4% to 2.7% for individual CWS and from 8.2%SS to 4.2%SS at the group level after the SM treatment. The group treated using ITNSS were also found to have declined the number of %SS to a greater extent than the EMG, HOMESS groups and control group, with 0.5%SS and 0.6 %SS across two clinical contexts (clinic and phone) (Craig et al., 1996). Similarly, Valentine (2014) reported that a child (P2) treated with FS demonstrated fewer %SS than a child (P2) who had received SM across three service delivery models. %SS reduction within individual approach was effective among CWS as shown in those studies.

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Percentage of SPM, SR and SSI also revealed an improvement in CWS fluency. This indicates that there is a positive correlation between %SS and SPM, SR and SSI. Table 2 shows that three studies (Craig et al., 1996; Hancock & Craig, 1998; Hancock et al., 1998) indicated a significant increase in speech ratings. However, EMG group was higher than the ITNSS, HOMESS and control groups (Craig et al., 1996; Hancock & Craig, 1998) in both clinic and phone conversation. The mean of all groups in Hancock et al.'s study at 12-month follow-up was higher than all groups' mean in Hancock and Craig study. Nevertheless, less improvement was noted by Ryan and Ryan (1995), recorded as 136 SPM.

Regarding SR and SSI tools, the level of SR was reduced to 'Mild' in three of the studies reviewed (Laiho & Klippi, 2007; Langevin & Kully, 2003; Senkal & Ciyiltepe, 2017) and were typical in Carey et al.'s (2014) study. However, in a study conducted by Laiho and Klippi's (2007) the score of SR did not alter in all of the participants. In fact, one out of nine studies using SSI assessment reported that FS brought about a significant decrease in SSI from 21 to 9, comparing favourably with SM from 23 to 15 (Valentine, 2014). There is a positive correlation between %SS reduction and SPM, SR and SSI as reported above. That is if there is a reduction in %SS, there is a decrease in SR and SSI, and thus an increase in the SPM.

Table 2: Summary of studies providing results of %SS,

SPM, SSI and SR in an individual approach.

Author	%SS		SPM		SSI		SR	
	Pre	Im	Pre	Im	Pre	Im	Pre	Im
Carey et al. (2014)	<i>M</i> = 6.2 %SS	<i>M</i> = 2.0 %SS	-	-	-	-	Mode rate	Typical
Craig et al. (1996)	EGM group In clinic: <i>M</i> = 10.6 %SS On telephone: <i>M</i> = 12.7%SS At home: <i>M</i> = 11.5%SS	EGM group In clinic: <i>M</i> = 0.8%SS In telephone: <i>M</i> = 1.9%SS At home: <i>M</i> = 1.4%SS	EGM group In clinic: <i>M</i> = 123 SPM On telephone: <i>M</i> = 126 SPM At home: <i>M</i> = 133 SPM	EGM group In clinic: <i>M</i> = 192 SPM On telephone: <i>M</i> = 193 SPM At home: <i>M</i> = 193 SPM				
	ITNSS group In clinic: <i>M</i> = 9.9%SS On telephone: <i>M</i> = 9.8%SS At home: -	ITNSS group In clinic: <i>M</i> = 0.5%SS On telephone: <i>M</i> = 0.6%SS At home: -	ITNSS group In clinic: <i>M</i> = 142 SPM On telephone: <i>M</i> = 139 SPM At home: -	ITNSS group In clinic: <i>M</i> = 164 SPM On telephone: <i>M</i> = 169 SPM At home: -				
	HOMESS group In clinic: <i>M</i> = 12.9%SS On telephone: <i>M</i> = 8.5%SS At home: <i>M</i> = 10.9%SS	HOMESS group In clinic: <i>M</i> = 1.2%SS On telephone: <i>M</i> = 1.9%SS At home: <i>M</i> = 9.1%SS	HOMESS group In clinic: <i>M</i> = 126 SPM On telephone: <i>M</i> = 137 SPM At home: <i>M</i> = 131 SPM	HOMESS group In clinic: <i>M</i> = 183 SPM On telephone: <i>M</i> = 187 SPM At home: <i>M</i> = 179 SPM	-	-	-	-
Control group In clinic: <i>M</i> = 9.4%SS on telephone: <i>M</i> = 8.5%SS At home: <i>M</i> = 8.8%SS	Control group In clinic: <i>M</i> = 10.0%SS On telephone: <i>M</i> = 9.6%SS At home: <i>M</i> = 9.4%SS	Control group In clinic: <i>M</i> = 142 SPM On telephone: <i>M</i> = 156 SPM At home: <i>M</i> = 147 SPM	Control group In clinic: <i>M</i> = 151 SPM On telephone: <i>M</i> = 155 SPM At home: <i>M</i> = 149 SPM					

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<p>Hancock and Craig (1998)</p>	<p>EGM group <i>M = 10.6%SS</i> ITNSS group <i>M = 9.9%SS</i> Home group <i>M = 12.9%SS</i></p> <p>All group <i>M = 11.1%SS</i></p> <p>9-11 years <i>M = 10.5%SS</i></p> <p>12-14 years <i>M = 12.4%SS</i></p>	<p>EGM group <i>M = 0.8%SS</i> ITNSS group <i>M = 0.5%SS</i> Home group <i>M = 1.2%SS</i></p> <p>All group <i>M = 0.8%SS</i></p> <p>9-11 years <i>M = 0.8%SS</i></p> <p>12-14 years <i>M = 1.0%SS</i></p>	<p>EGM group <i>M = 123 SPM</i> ITNSS group <i>M = 142 SPM</i> Home group <i>M = 126 SPM</i></p> <p>All group <i>M = 131 SPM</i></p> <p>9-11 years <i>M = 130 SPM</i></p> <p>12-14 years <i>M = 131 SPM</i></p>	<p>EGM group <i>M = 192 SPM</i> ITNSS group <i>M = 164 SPM</i> Home group <i>M = 183 SPM</i></p> <p>All group <i>M = 179 SPM</i></p> <p>9-11 years <i>M = 178 SPM</i></p> <p>12-14 years <i>M = 183 SPM</i></p>	-	-	-	-
<p>Hancock, et al. (1998)</p>	<p>All group <i>M = 11.1 %SS</i> Control <i>M = 9.4%SS</i></p>	<p>All group <i>M = 0.8%SS</i> Control <i>M = 10%SS</i></p>	<p>All group* In clinic: <i>M = 181 SPM</i> On telephone: <i>M = 186 SPM</i> At home: <i>M = 180 SPM</i></p>	<p>All group* In clinic: <i>M = 200 SPM</i> On telephone: <i>M = 204 SPM</i> At home: <i>M = 197 SPM</i></p>	-	-	-	-
<p>Laiho and Klippi (2007)</p>	<p>For individual <i>M = 4.4 %SS</i> For group <i>M = 8.2%SS</i></p>	<p>For individual <i>M = 2.7 %SS</i> For group <i>M = 4.2%SS</i></p>	-	-	-	-	Mode rate	Mild
<p>Langevin and Kully (2003)</p>	<p>For conversation task <i>M = 9.5%SS</i> and reading task <i>M = 2.4%SS</i></p>	<p>For conversation task <i>M = 0.3%SS</i> and reading task <i>M = 0%SS</i></p>	-	-	-	-	Mode rate	Mild
<p>Ryan and Ryan (1995)</p>	<p><i>M = 7.9 %SS</i></p>	<p>Within clinic (Reading, monologue and conversation) <i>M = 0.4 %SS</i> Beyond clinic (in home and school) <i>M =</i></p>	-	<i>M = 136 SPM</i>	-	-	-	-

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		1. 1%SS – 2. 0%SS						
Senkal and Ciyiltepe (2017)	Within word = Audible sound 24% and sound syllable 49% Between word = whole Word repetition poly 16%SS and Word repetition momo 9%SS Expression 2%SS	Within word = Audible sound 11% and sound syllable 34% Between word = whole Word repetition poly 10%SS and Word repetition momo 1%SS Expression (-)	<i>M = 77.3 SPM</i>	-	-	-	Mode rate	Mild
Valentine (2014)	P1 <i>M = 17%SS</i> P2 <i>M = 5.7%SS</i>	P1: Direct service: <i>M = 12.9 %SS</i> Hybrid model <i>M = 9.8%SS</i> Telepractice: <i>M = 7.37%SS</i> P2: Direct service: <i>M = 3.88 %SS</i> Hybrid model <i>M = 2.48%SS</i> Telepractice: <i>M = 2.46%SS</i>	-	-	P1 and P2 Moderate	P1 Mild P2 Very Mild		

Note: Pre= pre-treatment; Im= immediately post-treatment; P=Participant’s ID; (-) =No measurement used in study; (*) =Results of 12 months and 2 to 6 years post treatment; M= mean. See appendix A for more details.

3-Integration approach (pre- and immediately post-treatment)

- FS approach integrated with SM approach

Five out of 14 studies integrated FS with SM to treat CWS (Baumeister et al., 2008; Druce et al., 1997; Metten et al., 2007; Murphy et al., 2007; Salihovikj et al., 2010) (see Table 3). Three of these studies showed a significant reduction in the proportion of %SS: the performance of the group reported by Baumeister et al. (2008) and the performance of a child in Salihovikj et al.'s (2010) study indicated a reduction in their %SS from a high percentage of 22.2 %SS and 11%, to 9.5 and 9 %SS, respectively. Similarly, it was concluded in one case study that the mean group reduced to 1.75 %SS (Druce et al., 1997). Thus, this combined approach demonstrated a positive change in the %SS.

On the other hand, two out of these five studies reported improved SPM ratings. For example, children's speech improved from 92.3 SPM to 112.8 SPM within clinic (Druce et al., 1997). The adolescent who participated in Salihovikj, et al., 2010 study also yielded a significant increase in his speech rate from 109 SPM to 130 SPM, which is higher than speech rate of children in the previous study. In terms of SR, Druce et al. found that the SR reduced from 'Mild' to 'Very Mild'. SSI was also reduced from 'Mild' (3.16) to 'Very Mild' (1.95) in Metten et al. (2007), from 'Severe' (28) to 'Very Mild' (8) in Murphy, et al. (2007), and from 'Moderate' (24) to 'Mild' (13) in Salihovikj et al. (2010). Like the individual approach, the integrated approach also showed a positive correlation between reduction in the %SS, SPM, SR and SSI.

-Integration of FS or SM with a CBT approach

Blood (1995) combined FS approach with CBT approach. On an individual level, Blood revealed that the mean %SS for three participants dropped significantly from pre-treatment (17-22 %SS) to post-treatment (1-2 %SS). Furthermore, the above study demonstrated an improvement in SPM immediately post-treatment, ranging from 200-211 SPM. In addition, the SSI

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percentage displayed a reduction from ‘Moderate’ to ‘Mild, as in Salihovikj et al.’s study. Hancock & Craig (2002) compared the performance of 12 adolescents who recruited in Craig et al., 1996 after re-treating them by Smooth Speech, EMG feedback techniques and CBT. The mean of %SS reduced from above 5%SS to less than 2%SS in conversation across the three contexts (clinic, telephone and home) and improved speech ratings to nearly 200 SPM by the immediately post-treatment (see Table 3). Smits-Bandstra and Yovetich (2003), however, presented the results of a combined CBT and SM treatment, where only one member of the experimental group exhibited improvement in his speech rate. Nevertheless, this subject was found to have relapsed by the two-month follow-up; consequently, this approach was less effective in treating CWS (Smits-Bandstra & Yovetich, 2003). In this way, the combination of FS with CBT gave more positive results than SM with CBT.

- A combined FS and SM approach integrated with other approaches

From Table 3 it can be seen that Craig et al. (2002) combined smooth speech, EMG feedback, relaxation and a CBT approach due to retreatment six participants have relapse’s experience. This study reported that this combined approach dropped the %SS in four out of six participants from 5%SS to less than 5 %SS and five out of six increased their speech rate was approximately 200 SPM or above. In a further study, FS, SM, CBT, PCI and Solution Focused Brief Therapy were integrated; producing a result where the %SS ranged between 3 and 3.3 %SS at pre-treatment to between 1 and 2 %SS at post-treatment, with SR being noted as ‘Mild’ (Foullas & Marousos, 2015). Another study carried out by Kordell (2015) combined FS, SM and a mindfulness approach, and reported the result of disfluency’s types instead of four speech measures due to identifying “the total number of moments of disfluency for all samples across all participants” (Kordell, 2015, p.21). The mean of the total score for each type of disfluency reduced,

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from 9.6 to 7.8 in the reading task, with no change in total disfluency in the narrative task (Kordell, 2015).

Moreover, two studies presented by Fry et al. (2009) and Fry et al. (2014) integrated FS, SM, CBT and communication skills. Both studies concluded that this integration approach significantly reduced %SS: to 2.5 %SS and to at or below 1 %SS, respectively. The duration of stuttered syllables has decreased to 1.73 seconds (Fry et al., 2009). These results were obtained by comparing the subjects' performance at pre-and post-treatment, but no other speech measures were applied (SPM, SSI or SR). However, a study presented by Caugher and Dunsmuir (2017) has used the above-mentioned integration; concluding that the SSI was reduced in three out of the seven participants, so that it became 'Very Mild' (in two subjects) and 'Moderate' (in one subject). All types of integration FS and SM approaches with other approaches reported a reduction in the %SS, SR and SSI.

Table 3: Summary of studies providing the results of %SS, SPM, SSI and SR in an integration approach.

Author	%SS		SPM		SSI		SR	
	Pre	Im	Pre	Im	Pre	Im	Pre	Im
Baumeister et al. (2008)	$M = 22.2\%SS$	$M = 9.5\%SS$	-	-	-	-	-	-
Blood (1995)	$R = 17 - 22\%SS$	$R = 1 - 2\%SS$	$R = 167 - 174\ SPM$	$R = 200 - 211\ SPM$	Moderate	Mild	-	-
Caughter and Dunsmuir (2017)	-	-	-	-	Mild or Severe	Very Mild or Moderate	-	-
Craig et al. (2002)	$M = 5\%SS$	$M = < 5\%SS$	$< 200\ SPM$	$\geq 200\ SPM$	-	-	-	-
Druce et al. (1997)	$M = 9.5\%SS$	$M = 1.75\%SS$	$M = 92.3\ SPM$	$M = 112.8\ SPM$	-	-	Mild	Very Mild
Fourlas and Marousos (2015)	$R = 3 - 3.3\%SS$	$R = 1 - 2\%SS$	-	-	-	-	Moderate	Mild
Fry et al. (2009)	No significant trend	$M = 2.5\%SS$	-	-	-	-	-	-
Fry et al. (2014)	No significant trend	P1 $M = 1\%SS$ P2 $M = 0.8\%SS$ P3 $M = 0\%SS$	-	-	-	-	-	-

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Kordell (2015)	-	-	-	-	-	-	-	-
Hancock and Craig (2002)	In clinic: <i>M</i> = 5.4 % <i>SS</i> On telephone: <i>M</i> = 5.5% <i>SS</i> At home: <i>M</i> = 4.7 % <i>SS</i>	In clinic: <i>M</i> = 1.6 % <i>SS</i> On telephone: <i>M</i> = 1.9% <i>SS</i> At home: <i>M</i> = 1.6 % <i>SS</i>	In clinic: <i>M</i> = 177.5 <i>SPM</i> On telephone: <i>M</i> = 178.7 <i>SPM</i> At home: <i>M</i> = 180.6 <i>SPM</i>	In clinic: <i>M</i> = 198.3 <i>SPM</i> On telephone: <i>M</i> = 197.8 <i>SPM</i> At home: <i>M</i> = 198.9 <i>SPM</i>	-	-	-	-
Metten et al. (2007)	-	-	-	-	Mild	Very Mild	-	-
Murphy et al. (2007)	<i>M</i> = 11% <i>SS</i>	<i>M</i> = 2% <i>SS</i>	-	-	Severe	Very Mild	Severe	Mild
Salihovikj et al. (2010)	<i>M</i> = 11% <i>SS</i>	<i>M</i> = 9% <i>SS</i>	<i>M</i> = 109 <i>SPM</i>	<i>M</i> = 130 <i>SPM</i>	Moderate	Mild	Moderate	Mild
Smits-Bandstra and Yovetich (2003)	-	-	<i>M</i> = 14.4 <i>SPM</i>	<i>M</i> = 11.1 <i>SPM</i>	-	-	-	-

Note: Pre= pre-treatment; Im= immediately post-treatment; P=Participant’s ID; (-) =No measurement used in stud; <= less than; ≥= Greater than or equal. See appendix B for more details.

▪ **Goal Achievement and Fluency Maintenance:**

Reducing the frequency of stuttering is a desired aim for any approach. All included studies that reported in individual and integration approaches were investigated based on the criterion of either at or below 2%SS, which considering the cut-off for successful treatment (Andrews & Craig, 1988) and either at or less than 3% in Blood's (1995) study, by looking the outcomes of included studies at long follow-up.

1. **From 10 to 12 months follow-up period :**The performance of a participant recruited in Fry et al. (2009) and other three participants in Fry et al. (2014) achieved this aim (with the average 2% SS; less 2.5% SS, respectively) at 10-month follow-up. At 12 months, the outcomes of %SS in Blood's (1995) study revealed maintained in %SS performance in the three participants, with at or below 3 %SS. In individual approach, in contrast, 50% of the experimental groups were continued reducing the number of %SS to at or less than 1.2 %SS; however, one participant showed relapsing, with 12.2%SS at 12 months follow-up (Carey et al., 2014). Although the mean of %SS by 12-month follow-up was 3%SS or less, 30% of the group treated using either INTSS, EMG or HOMESS were also found to have increased the number of %SS, scoring higher than 5%SS (Craig et al., 1996). However, the mean of the three experimental groups (INTSS, EMG and HOMESS) in Hancock & Craig's (1998) study was 2.9%SS and 2.3% for group aged 9 to 11 years, but for group at 12-14 years found to have increased the number of %SS, with 4.2%SS. The integration approach maintained the improvement for longer period than the individual approach alone in all studies mentioned formerly.

2.**At 14 to 18 months follow up period:** The participants who treated by the technique of FS displayed maintenance in their fluency, with less than 1% at 14 months follow up (Ryan & Ryan, 1995). Nevertheless, in Druce et al.'s (1997) study, it was concluded that a combination of FS and SM approaches helps participants to maintain their fluency, with 2.90%SS at one year follow up, but at 18 months this score was increased to 3.83%SS. Thus, this latter score was considered relapsing as it exceeded the criteria of $\leq 3\%SS$.

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3. At two to six years follow up period: Although, the participants who received either INTSS, EMG or HOMESS in the study reported by Hancock, et al. (1998) maintained their achievement from one year, with an average of four years. After 2 to 6 years, 30% of participants had high %SS. Conversely, 75% of participants in the re-treatment group in Hancock and Craig’s (2002) study, it was concluded that a combination of FS, EMG feedback and CBT techniques maintained their fluency with less 2%SS by two-year follow-up. However, two of the total participants relapsed, with 5%SS (Craig et al., 2002). The integration approach was also effective in maintaining CWS fluency after a 2-year follow-up.

▪ **Examining the Impact of Stuttering on Quality of Life**

1. Child’s speech attitudes:

Table 4 provides that eight studies presented the outcomes of a CAT assessment. In two studies (Craig et al., 2002; Hancock & Craig, 2002) re-treated participants who had experienced relapsing by Smooth Speech, EMG feedback, relaxation and CBT, and Smooth Speech, EMG feedback and CBT, respectively. The findings of their studies showed an improvement on CWS’s attitude up to 2-year follow-up. Although three out of six participants had abnormal CAT score, another three participants scored within the normal score (Craig et al., 2002). Hancock and Craig, (2002) reported that the CAT scores measured abnormal, with 14.6. Nevertheless, the score of participants reported by Murphy et al. (2007), Furlas and Marousos (2015) and the mean of group in Kordell (2015) study indicated a normal speech attitude, scoring 10, 6 and 8.6 negative responses, respectively. Although the score of two participants in Smits-Bandstra and Yovetich (2003) were lost, the experimental subjects showed a normal speech attitude compared to control subjects. Conversely, two studies (Hancock et al., 1998; Valentine, 2014) demonstrated a positive reduction in the CAT score, but still above the mean of nonstuttering children (8.71). It may be noted that the studies where an integrated approach was adopted exhibited greater improvement in the participants’ speech attitude.

Table 4: Summary of studies providing the results of Communication Attitudes Test (CAT) in an individual and integration approach.

Author	Pre-	Post-treatment	2-years follow-
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	treatment		up
Craig et al. (2002)	P1 = 13 P2 = 7 P3 = 22 P4 = 32 P5 = 22 P6 = 11	P1 = 14 P2 = 10 P3 = 20 P4 = 32 P5 = 9 P6 = 21	P1 = 12 P2 = 13 P3 = 7 P4 = 30 P5 = 21 P6 = 22
Fourlas and Marousos (2015)	P1 = 16 P2 = 22	P1 and P2 M = 6	-
Hancock et al. (1998)	-	-	All participants: M = 12.4 EMG group: M = 12.4 INTSS group: M = 11.8 HOMESS group: M = 13
Hancock and Craig (2002)	M = 18.3	M = 17.3	M = 14.6
Kordell (2015)	M = 10.4	M = 8.6	-
Murphy et al. (2007)	M = 21	M = 10	-
Smits-Bandstra and Yovetich (2003)	-	Experimental participants Normal score Control participants High negative score	-
Valentine (2014)	P1: M = 15 P2: M = 17	P1: M = 13 P2: M = 10	-

Note: M= Mean; P=Participant’s ID; (-) = Data missing.

2.Thoughts and Feelings: Two studies carried out by Fry et al. (2009) and Fry et al. (2014) measured thoughts and feelings about stuttering among CWS, using a WASSP assessment. The results, shown in Table 5, indicate that negative thoughts and feelings were significantly diminished from a high to a low score in all the participants. These findings were generated using an integrated approach in both studies. However, articles on participants being treated with a single approach were not reported using this Scale.

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Overall, these studies highlight that the integration approach was more effective in changing CWS negative thoughts and feelings more than the individual approach.

Table 5: Summary of studies providing results of WASSP in an integration approach.

Studies	Pre-treatment	10 months follow-up
Fry et al. (2009)	<i>P1 = 61%</i>	37%
Fry et al. (2014)	<i>P1 = 100%</i>	< 60%
	<i>P2 = 90%</i>	73%*
	<i>P3 = 61%</i>	41%

Note: P=Participant’s ID; < = less than; * = the score at a 5-week follow-up.

3. Child’s confidence: The results obtained using the SEA scale are summarised in Table 7. In the two studies (Fry et al., 2009; Fry et al., 2014), the mean of three participants demonstrated an increased confidence until 10 months follow-up, scoring 9.11, 9.01 and 7.9, respectively. The second participant in Fry et al.’s (2014) study proved an increase until five-month follow-up. Moreover, Blood (1995) also reported another assessment used to measure confidence, namely the SESAS scale. From the data in Figure 6, it is apparent that the Scale also reported an increase in the mean of three participants’ confidence from 56.3% to 86.0% at one-year follow-up. The integration approach treatment demonstrated an improvement in participants’ confidence. After reviewing the included studies in this review, no papers so far focused on the use of self-confidence scales within individual approaches.

Table 6 Summary of studies providing the results of the SEA-scale scores in integration approach.

Author	Pre-Treatment	10 months follow- up
Fry et al. (2009)	<i>P1 = 7.52</i>	9.11
Fry et al. (2014)	<i>P1 = 6.05</i>	9.01
	<i>P2 = 6.07</i>	7.6*
	<i>P3 = 6.1</i>	7.9

Note: (*) = The score at 5-week follow-up

4. Quality of life: The outcomes of the OASES scale were reported in two studies where integration approaches were applied.

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Participants in both of these studies displayed a positive improvement in reducing the impact of stuttering from ‘Moderate’ to either ‘Mild’ or ‘Mild to Moderate’ (Furlas & Marousos, 2015) and from ‘Moderate to Severe’ to ‘Mild to Moderate’ (Caughter & Dunsmuir, 2017) immediately post-treatment. None of these studies, however, used an individual approach to report the results of this Scale.

Similarly, the findings of the ACES scale were mentioned in an individual approach (Carey et al., 2014) and an integrated approach (Metten et al., 2007). The mean of participants in Metten et al. displayed a decrease from ‘Mild to Moderate’ to ‘Mild’ at 10-month follow-up and from ‘Moderate to Severe’ to ‘Mild to Moderate’ (Carey et al., 2014) at 12 months follow-up. The integration approach showed a reduction in both scales (OASES and ACES), which indicates a significant improvement in CWS quality of life.

▪ Investigating attitudes toward stuttering

One study reported on the outcomes of the S-24 Scale, which measures attitudes and feelings with regard to stuttering. Blood (1995) concluded that three of the participants exhibited a reduction in their negative attitudes toward stuttering, with the mean score falling from 19.7% to 10.3% after one-year follow-up. Moreover, the findings of the LCB Scale revealed that the mean for the participants recruited by Fry et al. (2009) showed a positive change from 33 to 24 by the 10-month follow-up. However, among the participants in Fry et al.’s (2014) study, three failed to demonstrate a significant reduction: P1 displayed a reduction from 42 to 40; P2 showed a reduction from 34 to 31, and P3 exhibited a decrease from 34 to 30 by the 10-month follow-up. Thus, both scales demonstrated changing in the attitude of participants treated via the integration approach.

Overall, these results indicate that relapse’s percentage was higher in the FS approach compared to SM and other approaches, but some CWS did not relapse. Both individual and integration approaches reveal relapse among participants as shown in the previous studies (see section 3.4.2.1). With regards to the quality of sound, although some included studies found the sound of participants who treated via FS was unnatural, other studies concluded that CWS used sounds naturally (see section 3.4.2.2).

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In terms of providing better outcomes, the integration and individual approaches reduced %SS, SSI and SR, and increased SPM immediately post-treatment. Both approaches showed a correlation between %SS, SSI, SR, and SPM. However, the integration approach maintained the improvement for longer period. It is interesting to note that in all mentioned studies in this review, the integration approach was more significant than the individual approach in improving CWS' quality of life and changing their attitudes towards stuttering (see section 3.4.3).

Discussion the results

1. Individual approach versus integration approach: The current review illustrate that combined approaches were favoured over a single approach among clinicians, including FS and SM; FS, SM and CBT; and FS, SM and communication skills. This point is consistent with the view of many researchers (Conture, 1990; Ham, 1990; Peters & Guitar, 1991) who acknowledged that an integrated approach may work successfully with some school-aged CWS. This may indicate that the integration approach has some advantages over the individual approach; for example, according to Ward (2017), a combination of FS and SM assists CWS to control and decrease their stuttering and to change their attitudes toward stuttering.

2. Limited Evidence to Support the Use of SM approach : The researcher suggests that the reason why the SM approach has limited evidence compared to the FS approach is that FS has attracted more attention due to the notion of relapsing and the quality of sound. The review finds that the SM approach does not provide better outcomes than FS because both approaches showed relapse and that FS has a higher percentage of relapse than other treatments. Interestingly, the review demonstrates that relapsing can occur in other treatments, including ITNSS, HOMEES, EMG feedback, combination SM and FS and integration FS, EMG feedback, relaxation and CBT. This is consistent with a previous article (Ward, 2008)

which reported that the relapse occurs in all treatments, but the percentage of relapse was varied from approach to another.

In terms of quality of sound, the present review shows the sound of CWS treated by SM classified as natural sounding; moreover, those treated with the FS approach classified as nearly natural pattern. This is consistent with a previous study (Block et al., 2005), which examined the quality of speech among adolescents and adults by using NAT in pre-and post-treatment via clinical assessment. Block et al. found that participants in the post-treatment produced sounds more naturally.

Thus, the researcher supposes that researchers want to discover the reason behind occurring relapse after participants reached an elevated level of fluency. Additionally, it has been noted that most of included studies measured relapse by %SS and none of them emphasized if relapse also happens in duration of stuttered syllables. Furthermore, no general agreement has been reached about the definition of relapse in the literature. Therefore, further work needs to identify the reason of ignoring relapse in duration of stuttered syllables, and disagreement in relapse definition. Due to the use of airflow technique by participants who treated via FS, there was a debate among researchers about the naturalness of sound.

3. Investigating the outcomes of Individual and Integration Approaches: This current review showed that individual approach was effective to reduce the %SS immediately post-treatment but does not assist CWS to maintain their fluency during an extended follow-up period. This review was consistent with previous research which noted that FS was effective to reduce stuttering immediately post-treatment (Block et al., 2005); however, it is not consistent when concluding that participants maintained their fluency between 3.5 and 5 years follow-up. One probable reason for this is that Block et al. looked at participants who were older (mean 28 years). Furthermore, some of follow-up data were not available.

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Finally, Block et al. (2005) did not use any form of standardised self-report and did not report if participants increase their self-confidence or reduce the impact of stuttering on their life. Further research in this area might help to identify the reason behind these mismatched results. This evidence suggests that the integration approach provides better findings than individual approach in maintaining fluency.

The integration and individual approaches both appear to show effectiveness in decreasing %SS; however, the integration approach has more chances to maintain fluency for a longer period than individual approaches. This is not consistent with previous research, where a study noted no significant difference between an experimental group treated by AAF and another group that received combined FS and SM approach (Ritto et al., 2016). It may be the case that the age of the participants which causes these conflicting results. Ritto et al. reported the outcomes of %SS, but this review reported the outcomes of SSI, SR and SPM, which likely show different outcomes from the individual and integration approaches. For instance, Laiho and Klippi, (2007) study reported that SM alone reduces SR in some participants, but Druce et al.'s (1997) study reported that all participants who treated by integration SM with FS reduced their SR

The integration and individual approaches appear to show effectiveness in decreasing the SR and improving CAT, but the integration approach seems to demonstrate a more normal CAT among CWS post-treatment as well as maintaining this gain for two years in some reviewed studies. This is consistent with results reported by a previous study (Amster & Klein, 2008) which evaluated the performance of eight adults after treatment by CBT alone for 3 weeks and integration CBT with SM for another 3 weeks. These participants showed a significant reduction in the SR and improved CAT occurring after combined treatment and maintained this for 15 weeks (Amster & Klein, 2008).

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The individual approach (FS, SM, CBT) was also less effective than the integration approach (FS and SM or integrated with other CBT) in reducing the impact of stuttering on CWS's quality of life. This outcome is consistent with Menzies et al., 2008 who highlighted that speech restructuring (another name for FS) alone does not affect anxiety reduction and CBT demonstrates an improvement in anxiety, but participants' fluency did not increase during a one-year follow-up. This result was obtained from 32 adults recruited for a clinical trial (Menzies et al., 2008).

Besides decreasing the frequency of stuttering, the integration approach also tends to show a reduction in negative thoughts and feelings as well as fear from negative evaluation by others and this result was maintained up to a 10-month follow-up. Furthermore, the integration approach proves that participants' confidence increases over time up to a one-year follow-up. This is consistent with the definition of the successful treatment for stuttering that is reported by a number of researches (Blomgren, 2013; Johnson et al., 2016; Yaruss et al., 2012). These researchers, after addressing different approaches that delivered to children, adolescents and adults, showed the effectiveness of stuttering treatments are treating stuttering and its impact, including emotions and communication skills.

Interestingly, the integration and individual approaches show a positive correlation between reduction in %SS, SR and SSI, and improvement in SPM. This result is in line with Druce et al., 1997, who reported that SR and NAT correlated positively with %SS. More comprehensive results may be obtained from studies where an integrated approach is adopted because most of these studies reported the outcomes of tools that measure speech and findings of self-report questionnaires. Previous research has not reported this point. One likely reason is that studies that used the individual approach applied some measurement tools that assist the researchers to examine their hypothesis. These studies also may focus on one aspect when

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treating stuttering, either to increase fluency or reduce the impact of stuttering on CWS' daily life including anxiety.

4. Limitations of the present review:A number of important limitations need to be considered in this study. First, due to limitations in the number of studies that implemented FS and SM alone or integrated them with or without other approaches to CWS, the numbers of review studies are relatively small. Consequently, it makes generalisability of the results difficult. In addition to that, due to the shortage of time and the limited words account, this review did not analyse all areas, including anxiety, speech satisfaction and avoidance word; the length of program and the effectiveness of approaches. The researcher was cautious when reporting the outcomes of the included studies because each study has different aims, treatments and measures. Finally, two out of 29 included articles (De Nardo, 2017; Kordell, 2015) are unpublished papers and the researcher included these studies because they address some important points to answer the research questions addressed in this review.

5. Future research :This review needs to be replicated using meta-analysis to identify the effect size between the four speech measures (%SS, SR, SSI and SPM) and the self-report questionnaire, including CAT, WASSP, SEA, and OASES. Additionally, including more articles is needed to compare the different measures that are used in these articles. Further research focusing more specifically on the reason behind limited evidence supporting the use of an SM approach is needed.

6. Implications for research :All CWS have different aims when they seek treatment for stuttering disorders and these stutters have different situations; this can mean that if one treatment was successful with one stuttering child, it does not mean it will work with another. Hence, the implications of this review suggest integrating FS with SM alone or with other treatments that may help clinicians assist CWS to meet their goals and maintain their treatment gains.

▪ **Conclusions:**

The current review aims to identify reasons for the lack of supporting evidence toward the effectiveness of SM and to evaluate the outcomes of studies that used a combination approach with an individual approach for CWS. It is not the better outcomes of the SM that made it more effective than the FS, because both approaches showed a natural sound and a relapse after a period of time. Hence, the reason for more evidence in the FS approach is the debate between researchers about relapsing and the naturalness of sound.

Individual and integration approaches show the ability to reduce stuttering frequency immediately post-treatment, but the integration approach was able to maintain fluency for a longer follow-up period. Both approaches not only reduced the severity of stuttering but also improved speech attitude. Nevertheless, the degree of speech attitude was more toward 'normal' in the integration approach than in the individual approach. In addition, the integration approach appears to be more effective at reducing negative thoughts and feelings as well as fear from negative evaluation and increasing confidence; these gains were maintained up to the one-year follow-up. Finally, the integration approach provides more comprehensive outcomes than the individual approach.

The implications of these results encourage clinicians to use the integration approach when treating CWS to help them achieve and maintain their goals. The value of this review is in encouraging therapists to use the integration approach to treat CWS and protect their clients from relapse. This approach can treat various aspects of stuttering, instead of focusing on one aspect, including increasing fluency or addressing negative emotions. Moreover, this approach may be motivation for clinicians to meet goals that differ from one client to another.

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