International Journal of Education and Practice
2022 Vol. 10, No. 2, pp. 128-149.
ISSN(e): 2310-3868
ISSN(p): 2311-6897
DOI: 10.18488/61.v10i2.2994

A SYSTEMATIC REVIEW OF INTERVENTIONS USED TO REDUCE UNIVERSITY STUDENTS' SPEAKING ANXIETY

Hana Hossen M. Elahemer[1+]
Seriaznita Binti Haji Mat Said[2]

[1,2]*Faculty of Social Science and Humanities, Universiti Teknologi Malaysia, Malaysia.*
[1]*Email: Hanaelahemer@graduate.utm.my Tel: 00601164005204*
[2]*Email: seriaznita.kl@utm.my Tel: 00601922901 50*

(+ Corresponding author)

Article History
Received: 8 February 2022
Revised: 5 April 2022
Accepted: 20 April 2022
Published: 11 May 2022

Keywords
Anxiety reduction
Communication apprehension
Fear of speaking
Second/foreign language (S/FL) learning
Speaking anxiety
Speaking anxiety interventions
Systematic review
Undergraduate learners.

ABSTRACT

Despite a growing body of research, Speaking Anxiety (SA) reduction has been a prominent issue in Second/Foreign Language (S/FL) learning, especially among undergraduate students. The complexity and variety of features of Speaking Anxiety Interventions (SAI) make the synthesis and application of their findings in practice challenging. This study systematically reviews the existing evidence on SAI between January 2015 and mid-June 2021 to summarize and clarify the field's current state and offer directions for future research in the context of undergraduate learners. Seven established inclusion criteria were used to select studies. The study identified 2280 potentially eligible studies through Scopus, WOS, and Science Direct, 16 of which were eventually included. The studies applied a range of methodological designs and different types of interventions with various durations. This systematic review resulted in two main categories of SAI, namely direct and indirect, according to the mechanism used to intervene with SA. In addition to exploring innovative methods to promote effective SAI, future research should examine the cause of SA and learners' speaking English proficiency levels before selecting or applying any SA reduction approach that may significantly impact the success or failure of SAI.

Contribution/Originality: This study systematically reviews interventions employed to mitigate S/FL university learners' SA. It provides educators, scholars, instructors, and S/FL learners with valuable evidence to intervene and minimize the harmful effects of SA and optimize the learning experience.

1. INTRODUCTION

Mastering spoken English has become a crucial requirement in educational settings, in the job market, and in career development. The speaking skill is defined as "a productive aural/oral process that consists of using grammatical rules, cohesive devices, lexical items, phonological rules for expressing one's thoughts and feelings in speech" (Hammad & Ghali, 2015). Many learners consider conversing in English as a challenging and daunting task (MacIntyre, 2017). This is associated with several factors that may hinder and impede S/FL learning, including anxiety and low motivation. Anxiety has been acknowledged as the most widely researched emotion in S/FL learning. Compelling evidence demonstrates that speaking is the most anxiety-evoking aspect in S/FL learning (Gosiewska-Turek, 2018; Huashan, 2019; Kasap, 2019; Lu, Lee, & Lin, 2019; Milan, 2019; Saputra, 2018; Wilang & Vo, 2018). Traditionally, SA refers to the fear of oral language usage (Balemir, 2009 cited in, Miskam and Saidalvi

(2019)). Learners struggling with SA usually exhibit somatic signs of anxiety, such as sweating, trembling, nervous stomach, and shaking (Khusnia, 2016).

Research has found that excessive SA can lead to performance impairment, loss of concentration, and reticent behavior (Abbasi, Khalil, & John, 2019). Many suggestions, such as adopting a humanistic learner-centered approach, improving speaking proficiency through training, and creating a more friendly and low anxiety learning environment have been given to reduce S/FL anxiety (Galti, 2017; Sinaga, Syahrial, & Hati, 2020; Young, 1991). More recently, another line of SA research investigating the effectiveness of variety, suggested that SA reduction techniques continues to develop. However, there is a lack of consensus regarding what learning elements can be changed to manage SA. Therefore, the present study aims to systematically review and evaluate the existing evidence on SAI between January 2015 and mid-June 2021 to summarize and clarify the SA field's current state. This will provide educators, scholars, instructors, and learners with valuable evidence to intervene and minimize the harmful effects of SA and optimize the learning experience.

2. LITERATURE REVIEW

Early S/FL anxiety research focused on studying learners' anxiety levels and their correlation with linguistic and nonlinguistic variables. Various self-report instruments were created to measure S/FL anxiety levels, of which the Foreign Language Classroom Anxiety Scale (FLCAS) devised by Horwitz, Horwitz, and Cope (1986) is the most commonly employed by a bulk of later research. It is further argued that FLCAS was designed on the basis that speaking is the most anxiety-producing element in S/FL learning and, thus, it is dominated by statements expressing anxiety associated with speaking S/FL in classroom situations (Kearney & Ellis, 1995). In comparison with other language skills, speaking has attracted much attention from S/FL anxiety researchers. A plethora of studies has well documented the relationship between S/FL anxiety and low achievement (MacIntyre, 2017). Accordingly, a growing body of research has demonstrated the devastative impact of SA on S/FL learning (see a summary by MacIntyre (2017)); thus, coping with SA is widely acknowledged to be of high importance.

Given that language negatively impacts S/FL learning and learners' need to embrace attitudes and coping strategies, a series of S/FL anxiety literature has begun to investigate its causes and propose reduction methods (see Young (1991)) literature review regarding causes of S/FL anxiety). For example, Foss and Reitzel (1988) contended that if learners could recognize irrational beliefs or fears about language learning, they could overcome their anxiety. Horwitz (1990) suggested three methods to lower learners' language anxiety, namely systematic desensitization (managing anxiety by learning to remain calm during anxiety-provoking situations), skill training, and cognitive modification (alleviating anxiety by modifying learners' cognitive thoughts). Young (1991) recommended that teachers adopt a humanistic learner-centered approach and create a more relaxed classroom environment. Based on their study results, Koch and Terrell (1991) suggested dividing learners into small groups/pairs in which language is personalized to help them lower their language anxiety.

Since the 2000s, literature has examined S/FL learners' coping strategies in different learning contexts. Through browsing S/FL anxiety coping strategies literature, two lines of research could be acknowledged. One line is related to Kondo and Ying-Ling (2004) proposed typology of language anxiety coping strategies based on an analysis of 202 Japanese undergraduate learners' responses to an open-ended questionnaire. Their typology includes preparation, relaxation, positive thinking, peer seeking, and resignation. The findings of some SA studies suggested that the tactics reported by their participants tended to cohere with Kondo and Ying-Ling (2004) language anxiety coping strategies typology (Abdurahman & Rizqi, 2020; Genc, Kulusakli, & Annual, 2016; Yasuda & Nabei, 2018). For instance, Genc et al. (2016) found that highly anxious Turkish learners coped with their SA by employing relaxation and resignation strategies more than peer seeking, preparation, and positive thinking. Another line is associated with language learning strategies categorizations proposed by Oxford (1990); Akkakoson (2016); Widhayanti (2018); Woodrow (2006); Zhiping and Paramasivam (2013). Her language learning strategies

classification involves using direct strategies (memory, cognitive, and compensation strategies) and indirect strategies (metacognitive, affective, and social strategies). For example, Akkakoson's (2016) study with 88 Thai students identified a wide range of strategies applied to cope with SA, of which social strategies were the most frequently used, followed by metacognitive, compensatory, cognitive, and memory-related strategies, respectively.

More recently, examining the effectiveness of various educational interventions on SA has sparked increased scholarly attention. In plain words, many studies have designed and applied various SAI and evaluated their effectiveness on S/FL SA (Altunkaya, 2018; Dincer, OzÇelİk, Zülfünaz, & BahÇecİk, 2020; El Shazly, 2021; Pontillas, 2020; Zacarin, Borloti, & Haydu, 2019). Two methods have been observed about the SAI mechanism in dealing with SA, including intervening directly or indirectly. For instance, facing learners' SA directly through the employment of virtual reality-oriented interventions has been found to lower undergraduate learners' SA (Stupar-Rutenfrans, Ketelaars, & van Gisbergen, 2017). Improving and substituting negative emotions with more positive ones can help learners to boost positive emotions while lowering SA. For example, the emotional freedom technique (EFT), as employed in Dincer et al. (2020) study, can help decrease learners' SA.

Another method is intervening indirectly to mitigate SA, as seen in Pontillas (2020) study, which employed a feedback-oriented intervention that developed learners' speaking proficiency in addition to alleviating their SA. Also, developing learners' speaking skills through face-to-face or technological devices assistance by using various pedagogical means to combat SA indirectly has been noticed. For example, whether output-based or input-based, the application of strategic planning contributed to reducing Korean learners' SA (Lee & Kim, 2018). Although many educational interventions have been developed and employed and their impact on SA reduction were evaluated, their various features make it challenging to synthesize the results and implement them in practice.

Fortunately, one systematic review has reviewed foreign language anxiety reduction intervention regardless of learners' educational level (school or university) or learning skill evoked by anxiety (speaking, writing, reading, and listening). While this has offered useful indications concerning foreign language anxiety interventions (FLAI); however, its broad focus can make it complex and challenging to digest, plus it mainly included experimental studies, which can eliminate valuable information regarding language anxiety reduction interventions. In addition, Toyama and Yamazaki (2021) limited their methodological focus to include mainly experimental or quasi-experimental studies. This led to neglecting studies that adhered to other methodological designs that might arguably be of great significance in reducing foreign language anxiety.

Thus, the current study offers a rigorous and comprehensive analysis of interventions used to lower the undergraduate learners' SA regardless of their methodological designs. This will provide educators, scholars, instructors, and learners with a vast array of valuable evidence to intervene and minimize the harmful effects of SA and optimize the learning experience.

3. METHODOLOGY

A systematic review is a literature review technique that includes "clearly formulated questions" which "uses systematic and explicit methods to identify, select and critically appraise relevant research, and to collect and analyze data from the studies that are included in the review" (Cochrane Collaboration, 2003, as cited in Siddaway, Wood, and Hedges (2019)). The method adopted in this review adheres to the guidelines offered by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) (Moher, Liberati, Tetzlaff, Altman, & Group, 2009) framework to locate and identify relevant papers for the current review. In addition, for synthesis purposes, this review utilized a narrative approach which "can be used to synthesize both quantitative and qualitative studies". Aligned with the purpose of the study, a narrative approach was adopted to allow text-based synthesis instead of a statistical summary to transparently and systematically review the collected studies that utilized different methodologies (qualitative, quantitative, and mixed methods). Further, when a review includes experimental and quasi-experimental studies that are not sufficiently similar, a narrative approach can be employed

to facilitate meta-analysis (Mays, Pope, & Popay, 2005). Moreover, in developing the current systematic review process with the narrative approach, researchers primarily depended on four studies on systematic reviews (Jiménez, Ramos, González-Moraleda, & Resurreccion, 2020; Pluye & Hong, 2014; Siddaway et al., 2019; Toyama & Yamazaki, 2021) of which valuable insights were gained.

3.1. Literature Search

Three online databases, including Scopus, Web of Science (WOS), and Science Direct, were systematically searched to identify relevant studies to F/SL SAI. Key search terms were formed by employing single words and nested clauses combined with Boolean operators (AND, OR). These included ("speaking anxiety") AND ("treatment OR therapy OR intervention OR reduction OR reducing OR decrease OR decreasing OR alleviate OR lowering"), ("communication apprehension") AND ("treatment OR therapy OR intervention OR reduction OR reducing OR decrease OR decreasing OR alleviate or lowering"), ("fear of speaking") AND ("treatment OR therapy OR intervention OR reduction OR reducing OR decrease OR decreasing OR alleviate OR lowering"). Various forms of the same term (e.g., decrease, decreasing) were employed to capture more papers. This review was embarked on in mid-June 2021. The first author performed the search, and the second author supervised the systematic review process. The search yielded a total of 2280 studies (Scopus = 1669, Web of Science = 143, Science Direct = 331), of which 541 were excluded due to duplication, as exhibited in Figure 1. After analyzing the remaining 1739 potential related studies' titles and abstracts, further 1683 were excluded. Consequently, 60 studies were eligible for full-text screening and analysis against the inclusion and exclusion criteria as stated in Table 1:

Table 1. Inclusion and exclusion criteria for the review.

Classification	Inclusion Criteria	Exclusion Criteria
1. Publication year	From January 2015 to mid-June 2021	Before 2015
2. Language	English	Not English
3. Availability	Full text online	Not available
4. Publication type	Article or Conference Proceedings	Review, dissertation/thesis, pilot study, book chapter or book
5. Main variable	SA or public SA	Others (e.g., reading anxiety).
6. Intervention	Applying an intervention to reduce SA	Describing and explaining an intervention or giving suggestions to decrease SA
7. Population	Undergraduate students	others

To this point, because of not fully addressing the inclusion criteria, 44 studies were eliminated from the review. These studies were excluded because their participants were not undergraduates (n = 11), not all undergraduates (n = 6), not clear if they are undergraduates (n = 1), pilot study (n= 1), do not primarily focus on SA (n = 4), merely explain SAI (n = 4), interventions not used to decrease SA (n = 1), addressed other types of anxiety (n = 14), or full text not available (n = 2). Accordingly, 16 papers were included in this review and progressed to the data extraction process.

It is worth mentioning that reference harvesting for 16 studies was carried out to identify other relevant papers; however, no additional related studies were found.

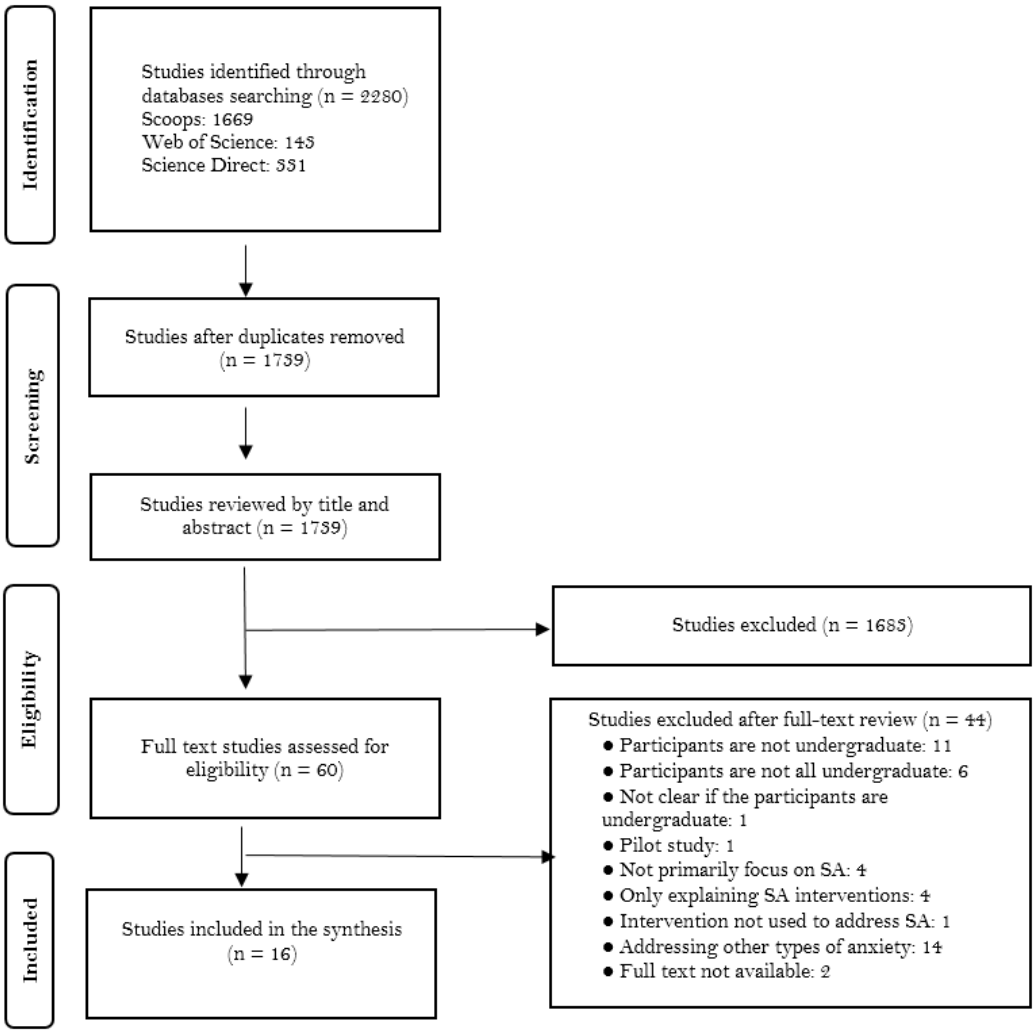

Figure 1. PRISMA flow chart of the SAI included in the review.

3.2. Data Extraction

Each of the 16 studies identified was read at least twice and then data was documented and imported into a table with predefined headings Table 2. These headings cohered into various characteristics of the papers which included publishing information (researcher, year of publication and location of study), Intervention (Intervention type, objectives of research, duration) research methodology (research approach, data collection instruments, analytic method, and validity, reliability, trustworthiness, and credibility), and major research outcomes. In the present review, the first author extracted the data, and the second author checked the extractions. Any disagreements were resolved through discussions. Subsequently, a quality appraisal of the 16 articles was conducted to ensure the best available evidence should be included in this review.

Table 2. Summary of data extracted from the studies included in this review.

No.	Author(s) Publication year Location Intervention Type	Sample	Research Approach (Duration)	Data collection instruments	Analytic method	Validity/ Reliability/ credibility	Major results
1	Altunkaya (2018) Turkey Activity-based oral presentation course	N = 80 males (n = 25) female (n = 55)	Experimental (1 course, 2 hours per week)	SASPST	Percentage Mean SD Paired t-test ANOVA Independent t-test Scheffe test	SASPST α =0 .96	Learners' SA increased
2	Chen (2018) Taiwan Interactive holographic learning system	N = 12 males (n = 6) females (n = 6)	Mixed-method (1 course)	Semi-structured interview Heart rate Observation FLCAS	n.a.	Content validity Criterion validity Construct validity Member checking	The designed intervention decreased learners' SA
3	Dincer et al. (2020) Turkey Breathing therapy and Emotional techniques	N = 76 males (n = 11) females (n = 65)	Experimental (1 session)	Descriptive Characteristics Form SUDS* STAI SAS	Shapiro-Wilks test Percentages Mean Median Pearson's chi-square Kruskal-Wallis H test Wilcoxon SRT Cohen's d effect size	STAI (state anxiety) (α = 0.81) STAI (constant anxiety) (α = 0.76) SAS (α = 0.80)	The intervention was effective in terms of lowering learners' SA
4	El Shazly (2021) Egypt Artificial intelligence	N = 38 males (n = 8) females (n = 30)	Experimental (8 weeks)	FLCAS IELTS speaking rubric	Percentage Paired t-test Mean Median Mode SD ANOVA Wilcoxon test Content analysis	FLCAS (α = 0.93) Cohen's κ = 0.83 Member checking	The intervention slightly increased learners' SA
5	Han and Keskin (2016) Turkey WhatsApp Mobile application	N = 39	Mixed-Method (3 weeks)	FLCA[1] Semi-structured interview	Mean SD Independent t-test Paired t-test Thematic analysis	n.a.	The intervention reduced learners' SA

6	Hashim, Yunus, and Hashim (2019) Malaysia 3-mintues pitching with Flip Grid	N = 22	Qualitative (n.a.)	Students' reflections and opinions	n.a.	n.a.	SA decreased confidence increased
7	Kilic, Eryilmaz, and Dinç (2018) Turkey Psychoeducational group training	N = 16 males (n = 7) females (n = 9)	Experimental (10 weeks, 10 sessions)	PANAS[1] STAI SWLS[1] Reflection paper	MWU Wilcoxon RST Friedman test Dunn-Bonferroni post hoc method Content analysis	PANAS (α = 0.73) STAI (α = .73) SWLS (α = .70)	The intervention decreased the learners' SA and increased their wellbeing
8	Kim, Hwang, and Cho (2018) Korea Simulation education with problem-based learning	N = 82 Males (n = 10), females (N = 72)	Experimental (4 months, 4 weeks)	PRCA-24 A 30-item schedule NCSE[1] and self-efficiency instrument SSES	Percentages Mean SD Paired t-test	PRCA-24, α = 0.87 B, α =0.90 A A 30-item, α = 0.78 B, α = 0.76 A MNCSE, α = 0.90 B, α = 0.95 A SSES α = 0.95	Communication apprehension in group discussion decreased Clinical self-efficacy increased
9	Lee and Kim (2018) Korea Input and output-based planning	N = 168	Longitudinal experimental (3 semesters)	OCSI FLCAS	Mean SD MANCOVA	OCSI (α = 0.88) FLCAS (α = 0.91)	Input and output-based planning contributed to reducing students' SA
10	LeFebvre, LeFebvre, Allen, Buckner, and Griffin (2020) The USA Introductory communication course	N = 559 Males (n = 371), females (n= 222)	Experimental (1 semester)	AA CAI PRPSA	Percentages Mean SD Paired t-test	AA (α = 0.92 B, α = 0.93 A) CAI (α = 0.89 B α = 0.88 A) PRPSA (α = 0.93 B, α =0.95 A) Krippendorff's (α = 0.77 B, α = 0.90 A)	The learners' SA decreased when enrolled in the communication course
11	Nazligul et al. (2019) Turkey 3D virtual reality and Psychoeducational therapy	N = 14 males (n = 4) females (n = 10)	Experimental (n.a.)	Demographic information form LSAS SUDS IAS SAAC BFNES Speech Task	Mean SD Wilcoxon SRT MWU	SAAS with three different samples respectively α = 0.94, 0.95 and 0.94	The two interventions were equally effective in decreasing SA
12	Pontillas (2020) The Philippine Popsispeak (teacher feedback)	N = 28	Mixed-method (1 semester)	PRPSA Impromptu speech rubric	Percentages Mean SD	The rubric was validated by 2 experts	The intervention developed learners' speaking skill and

				Reflective journal	Dependent t-test Pearson Moment of Correlation Thematic analysis		reduced their SA
13	Ramamuruthy (2019) Malaysia Task-based Approach	N = 30 males (n = 28) females (n = 2)	Quasi-experimental (7 weeks)	FLCAS IELTS speaking test	Paired t-test Mean SD Pearson correlation	n.a.	Learners' SA decreased
14	Stupar-Rutenfrans et al. (2017) The Netherlands Mobile virtual reality exposure	N = 35 males (n = 10) females (n = 25)	Experimental (4 weeks, 3 sessions)	PRCA-24 SAS ERQ	SD Paired t-test Independent t-test	PRCA-24 (α = 0.81 B, α = 0.92 A) State Anxiety Scale (α = 0.89 B, 0.93 A) ERQ reappraisal (α = 0.78) suppression (α = 0.76)	The intervention worked best to lowering SA in participants with high levels of SA
15	Wang, Yang, Shao, Abdullah, and Sundar (2020) USA Conversational agent (cognitive restructuring exercise)	N = 53 males (n = 35) females (n = 18)	Mixed- method (1 session)	SUDS Kiesler's scale[1] User experience evaluation PRCA[1]	Percentages Mean Standard deviation Paired t-test Independent t-test Thematic analysis	Perceived sociability (α = 0.83) Fear of being judged (α = 0.67) Usefulness (α = 0.80) Ease of use (α = 0.90) Fun of use (α = 0.93) Trait anxiety (α = 0.81)	The intervention helped to assuage learners' SA
16	Zacarin et al. (2019) Brazil Behavioral Therapy and Virtual Reality Exposure	N = 6 females (n = 6)	Experimental (Group 1, 13 sessions) (Group 2, 15 sessions)	SSPS SUDS Recording sheet Semi-structured questionnaire Interview CSQ	Percentages MCT Friedman test Spearman Rank Correlation Dunn's Multiple Comparison	SPSS (α = .90)	The intervention lowered students' SA

Note: FLCAS1, a modified version of Foreign Language Classroom Anxiety Scale; SD, Standard Deviation; PRCA-24, Personal Report of Communication Apprehension; SAS, State Anxiety Scale; ERQ, Emotional Regulation Questionnaire; SASPST, Speech Anxiety Scale for Pre-Service Teachers; ANOVA; Analysis of Variance; OCSI, Oral Communication Strategy Inventory; FLCAS, Foreign Language Classroom Anxiety Scale; MANCOVA, Multivariant Analysis of Covariance; PANAS1, a modified version of Positive and Negative Affect Schedule; STAI, State-Trait Anxiety Inventory; SWLS1, a modified version of Satisfaction with Life Scale; MWU, Mann-Whitney U test; Wilcoxon SRT; Wilcoxon signed-rank test; NCSES1, modified version of Nursing Clinical Self-Efficiency Scale; SSES, Satisfaction with Simulation Experience Scale; LSAS, Leibowitz Social Anxiety Scale; SUDS, Subjective Units of Distress Scale; IAS, Interaction Anxiousness Scale; SAAS, Social Appearance Anxiety Scale; BFNES, Brief Fear of Negative Evaluation Scale; AA, Audience Anxiousness; CAI, Communication Anxiety Inventory; PRPSA, Personal Report of Public Speaking Anxiety; SSPS, Self-Statement during Public Speaking Scale; CSQ, Client Satisfaction Questionnaire; MCT, Multiple Comparison Test; SUDS* Subjective Unit of Disturbance Scale; Kiesler's scale1, a modified version of Kiesler's scale, PRCA1 a modified version of Personal Report of Communication Apprehension; n.a. not applicable or insufficient description; α, Cronbach's alpha; B, Before intervention application; A, After intervention application.

4. SYNTHESIS OF RESULTS: STRENGTH AND WEAKNESSES

This review aimed to identify and systematically review published SAI studies between January 2015 and mid-June 2021 in an undergraduate context around the globe. Our search identified 16 studies that involved using interventions and investigating their effects on learners' SA. A descriptive analysis was conducted before analyzing key features of SAI to summarize trends of SAI interventions in the literature.

Although we limited our search to start with articles published in 2015, the earliest SAI study identified in this review was published in June 2016, and the final one in January 2021. An increase in SAI publications over that period was noted, except for the first half of 2021. Our quality assessment identified a total of 16 studies which comprised one qualitative, 11 either experimental or quasi-experimental, and four mixed methods. Studies were conducted in nine countries: Turkey (n = 5), the Netherlands (n = 1), Korea (n = 2) Taiwan (n= 1), Malaysia (n = 2), the USA (n = 2), Brazil (n = 1), the Philippine (n= 1), Egypt (n = 1); further, over half of the studies (n = 10) were performed in east or west Asia.

Regardless of their methodological designs, all studies aimed to investigate the effect of their interventions on undergraduate students' SA. Regarding intervention duration, the longest lasted for three semesters (Lee & Kim, 2018), while a one-session intervention was the shortest (Dincer et al., 2020; Wang et al., 2020). Less than half of the interventions took between one to ten weeks to be conducted (n = 7), 37% were performed over a period of one semester/course to three semesters (n = 6), whereas three studies either did not specify the duration of its intervention (Hashim et al., 2019; Nazligul et al., 2019) or merely reported the number of sessions (12 sessions) conducted (Zacarin et al., 2019).

All of the SAI studies included in this review had a sample size of less than 100, except for two studies: LeFebvre et al. (2020) and Lee and Kim (2018), which involved 559 and 168 participants respectively. Using software (G*Power) to calculate sample size as recommended by Dincer et al. (2020) and Kim et al. (2018), while sample representativeness was discussed in accordance with El Shazly's (2021) study. In addition, 37% of the studies reported their participants' numbers without mentioning their gender (n = 6). About 70% of the studies included participants aged 18 to 40, exempting five studies that did not mention their participants' age range. Ignoring reporting participants' age range and gender can be, to some extent, tolerated. However, insufficient explanation concerning sampling techniques used to recruit the participants and their representativeness of the target population can seriously impact the findings' generalizability and transformability to similar populations or contexts.

As exhibited in Table 2, various means of determining the effectiveness of the SAI were employed across all of the included studies in the present review which included Foreign Language Classroom Anxiety Scale (FLCAS) (Horwitz et al., 1986) as the most popular (n = 5) tool, followed by Personal Report of Communication Apprehension Scale (PRCA-24) (McCroskey, Beatty, Kearney, & Plax, 1985) (n = 3), State-Trait Anxiety Inventory (STAI) (Spielberger, 1983) (n = 3), and semi-structured interview (n = 3). Also included were the IELTS speaking rubric (n = 2), Subjective Units of Distress Scale (SUDS) (Wolpe & Lazarus, 1966) (n = 2), and Subjective Units of Disturbance Scale (SUDS) (Wolpe., 1969) (n = 2). Studies also employed other scales to detect the effectiveness of their interventions including, the Turkish version of the Positive and Negative Affect Schedule (PANAS) (the original PANSA was developed by Watson, Clark, and Tellegen (1988)), Speaking Anxiety Scale (SAS) (Yaman & Sofu, 2013), Audience Anxiousness (AA) (Leary, 1983a), Communication Anxiety Inventory (CAI) (Booth-Butterfield & Gould, 1986), PRPSA, Personal Report of Public Speaking Anxiety (McCroskey, 1970), Self-Statement during Public Speaking Scale (SSPS) (Hofmann & DiBartolo, 2000), Liebowitz Social Anxiety Scale (LSAS) (Liebowitz, 1987), Interaction Anxiousness Scale (IAS) (Leary & Kowalski, 1993), Social Appearance Anxiety Scale (SAAS) (Hart et al., 2008), Brief Fear of Negative Evaluation Scale (BFNES) (Leary, 1983b), and Speech Anxiety Scale for Pre-Service Teachers (SASPST) (Leary, 1983b).

Even though only 16 studies were included in this review, it can be noticed that a large number of scales have been reported above. This is because several studies used more than one scale in their data collection. Besides using well-known SA measurements, mixed-method studies (n = 4) developed various other tools. This comprised a Client Satisfaction Questionnaire (CSQ), recording sheet, interview script (Zacarin et al., 2019), observation, impromptu speech rubric, and reflective journal (Pontillas, 2020), and four items used experience evaluation and three open-ended questions (Wang et al., 2020). Meanwhile, Hashim et al.'s (2019) qualitative study used students' opinions and reflections to explore the effectiveness of their intervention on learners' SA.

Besides assessing the interventions' efficacy in reducing undergraduate learners' SA, some studies measured other variables, such as emotion regulation (Stupar-Rutenfrans et al., 2017) (Emotional Regulation Questionnaire (ERQ developed by Gross and John (2003)), communication strategies (Lee & Kim, 2018) (Oral Communication Strategy Inventory (OCSI) created by Nakatani (2006), satisfaction with life (Kilic et al., 2018) (Satisfaction with Life Scale (SWLS) invented by Diener, Emmons, Larsen, and Griffin (2010) assertiveness (Kim et al., 2018) (30 item schedule designed by Rathus (1973) Rathus (1973), and satisfaction with simulation practical education (Kim et al., 2018) (Satisfaction with Simulation Experience Scale (SSES) devised by Levett-Jones et al. (2011). Moreover, one study (Kim et al., 2018) integrated two instruments to measure nursing clinical self-efficiency, which are the adjusted form of Nursing Clinical Self-Efficiency Scale (MNCSES) (the original scale is constructed by Rathus (1973)), and self-efficiency instrument established by Parker (1993).

Having employed various tools to examine the effectiveness of the SAI, all studies reported using at least one validation method, except for two studies that did not clearly present their validation techniques (Han & Keskin, 2016; Hashim et al., 2019). Considering analytic methods of the SAI studies, descriptive statistics (percentages, mean, standard deviation, and median) was the most popular, with more than two-thirds of the studies reported using at least one or a mixture of the descriptive-analytic tools (n = 13). Following this, almost all studies (n = 14) indicated performing a statistical test/s or/and qualitative analysis, while two studies did not clearly articulate their analytical techniques (Chen, 2018; Hashim et al., 2019). About 43% of studies performed paired t-test (n = 7), followed with Wilcoxon signed-rank test (n = 4), thematic analysis (n = 3) independent t-test (n = 3), Friedman test (n = 2), Mann-Whitney U test (n = 2), ANOVA (n = 2), MANCOVA (n = 1), Multiple Comparison Test (n = 1), Pearson's chi-square (n = 1), Kruskal-Wallis H test (n = 1), and Scheffe test (n=1).

5. QUALITY APPRAISAL

A quality assessment for each of the 16 papers was conducted to ensure their methodological rigor. Examining the research design of the included papers revealed that 11n of them were either quasi-experimental or experimental, four employed mixed-methods design, and only one adopted a qualitative research approach. Quasi-experimental and experimental studies were assessed by drawing on nine questions offered by Joanna Briggs Institute (JBI), as shown in Table 3 and Table 4. As depicted in Table 5, the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018) was employed to evaluate the quality of mixed-method papers. Meanwhile, the risk of bias for the qualitative paper was assessed by employing the Critical Appraisal Skills Program (CASP) checklist, as shown in Table 6.

To be included in this review, papers should at least fulfill four criteria of their assessment tool. The full criteria of each assessment tool are mentioned in the Tables (3, 4, 5). This means that to be considered in this review, each study must score 4 in its quality appraisal. When calculating the sum score of each evaluation, all 16 papers scored four and above, so no study was excluded from this review. Conducting the quality appraisal of the included papers revealed that six papers were classified as of high quality (Dincer et al., 2020; Kilic et al., 2018; Lee and Kim, 2018, Nazligul et al., 2019,; Wang et al., 2020, Zacarin et al., 2019), and ten papers were deemed to be of moderate quality (Altunkaya, 2018; Chen, 2018; El Shazly, 2021; Han & Keskin, 2016; Hashim et al., 2019; Kim et al., 2018; LeFebvre et al., 2020; Pontillas, 2020; Ramamuruthy, 2019; Stupar-Rutenfrans et al., 2017.

Table 1. Quality Appraisal for the included experimental studies.

Appraisal Questions	Author/s and year of publication Yes= Y, No =N, Unclear= UC, Not Applicable= NA				
	Altunkaya (2018)	Kilic et al. (2018)	Kim et al. (2018)	Nazligul et al. (2019)	LeFebvre et al. (2020)
1. Was it clear in the study what the "cause" and the "effect" were (i.e., there was no confusion about which variable comes first)?	Y	Y	Y	Y	Y
2. Were the participants included in any comparison similar?	Y	Y	NA	Y	NA
3. Were the participants included in any comparison receiving similar treatment/care, other than exposure or intervention of interest?	NA	Y	NA	NA	Y
4. Was there a control group?	NA	Y	N	Y	N
5. Were there multiple measurements of the outcome both before and after the intervention/exposure?	N	Y	Y	Y	Y
6. Was the follow-up complete, if not were differences between in terms of their follow-up adequately described and analyzed?	NA	Y	UC	N	Y
7. Were the outcomes of participants included in any comparison measured in the same way?	NA	Y	NA	Y	N
8. Were outcomes measured in a reliable way?	Y	Y	Y	Y	Y
9. Was appropriate statistical analysis used?	Y	Y	Y	Y	Y
Overall appraisal score	4	9	4	7	6
Quality (H = High, M = Moderate)	M	H	M	H	M

Table 2. Quality Appraisal for the included experimental studies.

Appraisal Questions	Author/s and year of publication Yes= Y, No =N, Unclear= UC, Not Applicable= NA					
	Ramamuruthy (2019)	Zacarin et al. (2019)	Dincer et al. (2020)	El Shazly (2021)	Lee and Kim (2018)	Stupar-Rutenfrans et al. (2017)
1. Was it clear in the study what the "cause" and the "effect" were (i.e., there was no confusion about which variable comes first)?	Y	Y	Y	Y	Y	Y
2. Were the participants included in any comparison similar?	NA	Y	Y	NA	Y	NA
3. Were the participants included in any comparison receiving similar treatment/care, other than exposure or intervention of interest?	NA	Y	Y	NA	Y	NA
4. Was there a control group?	N	N	Y	N	N	N
5. Were there multiple measurements of the outcome both before and after the intervention/exposure?	Y	Y	Y	Y	Y	Y
6. Was the follow-up complete, if not were differences between in terms of their follow-up adequately described and analyzed?	NA	Y	N	N	UC	UC
7. Were the outcomes of participants included in any comparison measured in the same way?	NA	Y	Y	NA	Y	NA
8. Were outcomes measured in a reliable way?	Y	Y	Y	Y	Y	Y

Appraisal Questions	Author/s and year of publication Yes= Y, No =N, Unclear= UC, Not Applicable= NA					
9. Was appropriate statistical analysis used?	Y	Y	Y	Y	Y	Y
Overall appraisal score	4	8	8	4	7	4
Quality (H = High, M = Moderate)	M	H	H	M	H	M

Table 3. Quality Appraisal for Included Qualitative study.

Critical Appraisal Skills Program (CASP) check list for qualitative studies	Author/s and year of publication Yes = Y, No = N, Cannot Tell = CT Hashim et al. (2019)
1. Was there a clear statement of the aims of the research?	Y
2. Was a qualitative methodology appropriate?	Y
3. Was the research design appropriate to address the aims of the research?	Y
4. Was the recruitment strategy appropriate to the aims of the research?	CT
5. Was the data collected in a way that addressed the research issue?	Y
6. Has the relationship between researcher and participants been adequately considered?	CT
7. Have ethical issues been taken into consideration?	CT
8. Was the data analysis sufficiently rigorous?	CT
9. Was there a clear statement of findings?	Y
10. Was the research valuable?	Y
Overall appraisal score	6
Quality (H = High, M = Moderate)	M

Table 6. Quality appraisal for mixed-method studies.

MMAT, version 2018 for mixed method studies	Author/s and year of publication Yes = Y, No = N, Cannot Tell = CT			
	Han and Keskin (2016)	Chen (2018)	Pontillas (2020)	Wang et al. (2020)
1. Are there clear research questions in the study?	Y	Y	Y	Y
2. Do the collected data address research questions?	Y	Y	Y	Y
3. Is there an adequate rationale for using a mixed methods design to address the research question?	Y	CT	Y	Y
4. Are different components of the study effectively integrate to answer research questions?	Y	Y	Y	Y
5. Are the out-puts of the integration of qualitative and quantitative components adequately interpreted?	Y	Y	Y	Y
6. Are divergence and inconsistencies between quantitative and qualitative results adequately addressed?	CT	CT	CT	Y
7. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?	CT	N	CT	CT
Overall appraisal score	5	4	5	6
Quality (H = High, M = Moderate)	M	M	M	H

6. TYPES OF INTERVENTIONS USED TO REDUCE SA

In the current review, SAI were conceived to include all scholar performed attempts that target assuaging SA within the context of undergraduate F/SL Learners. Our SAI classification was informed by their mechanism and, in particular, how they operated to address the SA issue. According to this conceptualization, SAI can be categorized into two main and broad categories: direct and indirect. This distinction is supposed to be of usefulness as it isolates anxiety stimuli and ties it with the most appropriate intervention. Although the proposed categories share the same aim, i.e., alleviating SA, they adopt different manners to achieve this goal. Figure 1 shows the classifications of SAI. The classifications on the left are based on our systematic review results with their examples provided on the right. Each main category (direct and indirect) is divided into more subcategories: Habituation-based, self-management, face-to-face speaking skill training with technology, and feedback-oriented. The following sections pull together all SAI reviewed in this paper and summarize the main results of each within their respective category.

6.1. Direct SAI

Generally, direct interventions address mitigating SA without the involvement of any other intermediary(ies). This implies that the employment of these interventions is directed to treat SA through following their diversified instructions and techniques. In other words, direct SAI constitutes various ranges of interventions designed to mitigate SA by leveraging their different techniques. In this sense, the direct interventions explicitly target SA management. These Inventions can be further subdivided according to the issue(s) they are designed to deal with into habituation-based and management-oriented subcategories. These subcategories will be analyzed in the following paragraphs.

Habituation-Oriented on one hand, the basic premise of habituation-based interventions, as the name implies, is that individuals, over time, become habituated to SA evoking stimuli and recognize that the anticipated catastrophic situation is unlikely to occur (Milosevic & McCabe, 2015). As a result, they get multiple opportunities to re-evaluate the irrationality of their beliefs and manage their fears appropriately. The current review found three studies (Nazligul et al., 2019; Stupar-Rutenfrans et al., 2017; Zacarin et al., 2019) that employed virtual reality exposure. This exposure can be classified as a habituation-based SA intervention. Gradual exposure technique regarding the number of audiences (empty class, small audience, and large audience) and/or the size of the avenue (small followed by medium and then large) was employed by these studies to elicit participants' SA and familiarize them with virtual reality avenue.

Nazligul et al. (2019) carried out an experimental study to test the effectiveness of computerized 3 dimensioned virtual reality exposure compared to psychoeducation training concerning reducing SA. As evidenced by Wilcoxon singed rank test. Both interventions led to a significant decline in SA; however, the effectiveness could not be determined in the long-term due to a lack of follow-up. The findings of Stupar-Rutenfrans et al. (2017), a longitudinal experimental study, revealed that virtual reality exposure was more effective in decreasing SA for participants with high SA levels than their counterparts with moderate levels of SA. Zacarin et al. (2019) found that virtual reality exposure was accompanied by a breathing exercise. Although they reported that the said intervention contributed to lowering the participants' SA with the conduction of two follow-ups, we need to interpret this result with extra caution due to the relatively small sample size (n = 6) besides the fact that all participants were females. By contrast, Nazligul et al. (2019) and Zacarin et al. (2019) used computer-based virtual reality exposure, while Stupar-Rutenfrans et al. (2017) employed a mobile-based virtual reality exposure. A shared criticism among these studies was that they recruited relatively small samples. However, the amount of information and descriptions provided by each author researcher of the three studies concerning virtual interventions designs and implementations provided sufficient details that might allow replication with large samples.

SA Management-Oriented. On the other hand, management-oriented interventions are those which are directed at developing individuals' ability to manage SA by adopting diversified techniques. Scholars worked on improving and understanding learners' negative emotions associated with SA. Comparing the efficacy of breathing therapy, and Emotional Freedom Technique (EFT), Dincer et al. (2020) concluded that EFT was more effective than Breathing therapy concerning SA reduction, as demonstrated by Cohen's effect size. Breathing therapy was performed through the following three stages: relaxation stage, breathing stage, then feel yourself stage, whereas EFT consists of preparation (identifying reasons and measuring levels of anxiety), followed by repeating some sentences (e.g., I forgive myself) while a therapist was tapping on participants' meridian system. At the feel yourself stage, participants would take a breath and recite inside some sentences such as 'I love myself'. Although Dincer et al. (2020) study included a control group and a comparison group, the intervention was applied in a single session without follow-up.

Drawing on cognitive reconstructing principles, Wang et al. (2020) designed a stimulated tutoring session that offered training and practice on overcoming SA through a conversational agent. The conversational agent was presumed to serve as a psychological counselor by which its users divulged private information. Although Wang et al.'s (2020) paired t-test demonstrated no significant difference in participants' pre- and post-speech anxiety scores, the qualitative data revealed that the conversational agent contributed to mitigating pre-speech anxiety. In a similar vein, a psychoeducational group training led to a significant reduction in SA and a higher life satisfaction score in the experimental group compared with the control group (Kilic et al., 2018). More interestingly, the training's positive impact was still evident at the time of the follow-up one year later.

6.2. Indirect SAI

In the present review, indirect SAI refers to those interventions that reduce SA by addressing individuals' speaking skills rather than dealing directly with SA. In other words, indirect interventions used various techniques to develop and foster learners' speaking skills which are presumed to reduce SA. Although indirect SAI are not strictly targeting anxiety management, they can probably facilitate SA assuaging. These can be further subdivided into face-to-face speaking skill training, speaking skill training with technology and feedback oriented.

Face-to-Face Speaking Skill Training. Some interventions reviewed in this study opted to improve learners' speaking ability through various pedagogical means, which are assumed to alleviate learners' SA eventually. LeFebvre et al. (2020) examined the changes in SA that participants experienced while engaging in an introductory communication course. Although LeFebvre et al. (2020) found that participants' SA decreased over time, there is a lack of understanding regarding what precisely reduced participants' SA. Applying strategic planning in which output-based planning group was compared to input-based planning group, Lee and Kim (2018) reported a significant decrease in SA over time regardless of planning strategy.

Further, simulation education combined with problem-based learning decreased nursing students' communication apprehension in group discussion and boosted their clinical self-efficacy, yet there was no significant difference in their assertiveness (Kim et al., 2018). However, what specifically served to reduce nursing's communication apprehension in group discussion through the stated intervention remains unclear. It is essential to interpret the study's results with some caution due to several concerns, including the small sample size consisting of mainly male participants, the lack of a control group and follow-up, and using the same speaking task to assess participants' speaking ability in pre- and post-intervention. The employment of a task-based approach positively impacted participants' post-test grades, but its effectiveness in reducing learners' SA remains unclear (Ramamuruthy, 2019). However, developing speaking skills might not result in SA reduction. For instance, an activity-based oral presentation course increased psychological counseling department students' SA rather than decreasing it (Altunkaya, 2018).

Speaking Skill-Training with Technology. It is probably undeniable that technology has impacted how individuals do things and how it has become an indispensable part of life, wherein the educational environment is no exception. Speaking skill training with technology interventions may have the potential to achieve both SA reduction and S/FL development. They are designed to foster learners' speaking abilities through interacting with virtual characters or with each other through using a range of technological means to carry out that interaction. Using a mobile application (e.g., Flip Grid) to record participants' impromptu speech videos, Hashim et al. (2019) found that adopting speaking routines in a classroom environment helped their participants develop their speaking skills and self-confidence while reducing SA. However, the effectiveness of Hashim et al. (2019) intervention was based on participants' reflections and opinions rather than statistical analysis.

In a similar vein, the employment of the WhatsApp mobile application also resulted in SA decline to some extent (Han & Keskin, 2016). Notwithstanding that the male participants experienced higher SA levels than their female counterparts between pre-and post-intervention, females lowered their SA towards the end of the said intervention more than male participants. Chen (2018) provided learners with a holographic learning support system that helped them practice speaking in different scenarios and ultimately declined their SA. Practicing speaking with the assistance of technology may not result in SA decrement. For instance, artificial intelligence (chatbots and *Mondly*) slightly intensified undergraduate learners' SA, yet it contributed to facilitating their language learning and resulted in some ensuing gains; however, the study lacked a control group (El Shazly, 2021).

Feedback-Oriented. The current review also found one study utilizing teacher feedback to improve participants' speaking abilities and reduce SA. Notwithstanding that there was no control group, Pontillas (2020) found that *Popsispeak* (Outcome Based Teaching and Learning Strategy) lowered participants' SA and enhanced their speaking abilities. Interestingly, the teacher-researcher provided feedback in the form of motivational letters to each student after his/her speech delivery, which included suggestions for improving participants' speaking skills.

7. DISCUSSION

The current study has examined a range of SAI employed in undergraduate context around the globe between January 2015 and Mid-June 2021 in terms of their association with SA decrement to summarize and clarify the current state of the field and offer directions for future research. A total of sixteen studies that have met the inclusion criteria and have had a quality rating of at least moderate were included in this review. Notwithstanding that this is a small sample, it demonstrates a range of SAI used in undergraduate education in various countries with varying durations and results. Generally, the review offers a promising indication regarding the efficacy of various interventions in the mitigation of SA. Some of the most pertinent issues from this review will be discussed next.

In line with previous research, virtual reality exposure interventions decreased S/FL learners' SA (Nazligul et al., 2019; Stupar-Rutenfrans et al., 2017; Zacarin et al., 2019). In a virtual environment, usually with a trained therapist conducting the treatment, individuals confront computerized simulation of anxiety-evoking situations wherein the environment can be manipulated and customized according to the individuals' fears (Chesham, Malouff, & Schutte, 2018). Virtual reality exposure habituates individuals to anxiety-producing situations by gradually confronting each situation, starting with the least then the most feared until anxiety decline (Carl et al., 2019). In the studies, Nazligul et al. (2019) and Zacarin et al. (2019), computerized virtual realities were used solely in the research site and under the guidance and supervision of an experimenter or a therapist. In contrast, participants used (Stupar-Rutenfrans et al., 2017) mobile video virtual reality exposure in their home environments, making it perhaps more flexible, cost-effective, and feasible concerning time and human resources.

Giving that each study's sample size was relatively small (Nazligul et al., 2019; Stupar-Rutenfrans et al., 2017; Zacarin et al., 2019), the generalizability of the findings to a broader or a similar population might be questionable. Thus, further work is required with a larger population. Additionally, due to the Covid-19 pandemic, online

teaching and learning have become the accepted norm instead of face-to-face instructions across different countries around the world. Thus, the virtual world has become the actual one in many aspects of our lives, and education is no exception. Indeed, learners now have access to various programs, such as Zoom and WebEx, that may substitute virtual reality exposure programs in the sense that in many educational institutions, these programs form the virtual environment where learning and teaching take place and, therefore, provide learners with more authentic SA experiences. Additionally, these programs may also be combined with other types of interventions designed to reduce SA. Accordingly, future research should examine the efficacy of these programs when combined with other interventions to reduce SA.

Some interventions were designed to develop individuals' ability to manage SA. Wang et al. (2020) designed a conversational agent to assuage SA by drawing on cognitive reconstructing principles. Cognitive reconstructing is a part of the cognitive-behavioral interventions family, which is assumed to assist people to correct their negative self-perceptions by determining irrational and negative self-statements and then substituting them with more rational and positive ones (Fremouw & Zitter, 1978). The employment of the conversational agent did not demonstrate a significant statistical SA reduction. However, the qualitative analysis demonstrated that the stated intervention contributed to alleviating pre-speech anxiety. Nevertheless, it is essential to note that evaluating the efficacy of the intervention from one laboratory session does not permit long-term evaluation. Therefore, longitudinal research in a classroom environment is needed to assess whether the said intervention can have a positive long-term effect on individuals' SA. In addition, some participants complained about not receiving personalized feedback from the conversational agent about their performance, so future designs can consider incorporating this technique into their conversational agents' designs.

In contrast to Wang et al. (2020)) cognitive restructuring, Kilic et al. (2018) psychoeducational training sessions were carried out by a human trainer rather than a computerized conversational agent, wherein SA was reduced significantly. Cognitive-behavioral techniques (CBT) and subjective well-being-increasing activities (SWIA) were both utilized in the development of Kilic et al. (2018) intervention which aimed to improve learners' self-awareness and helped them to discover the most appropriate SA reduction methods on their own. During the intervention sessions using group dynamics, participants discussed causes and levels of anxiety arousal and used effective activities to address suitable solutions. Despite the small sample size, this SA reduction intervention seemed feasible, cost-effective, and realistic. It can be implemented in educational settings without much effort from instructors since their roles were limited to planning, moderating, creating a positive environment, and facilitating the whole process. Further, our literature review identified some interventions designed to improve and foster speaking skills using various pedagogical and technological training approaches. For example, when reporting the effectiveness of the task-based approach apropos decreasing SA, Ramamuruthy (2019) stated that the intervention positively affected participants' grades as learners with high anxiety levels achieved low grades compared with less anxious ones.

These study results need to be interpreted cautiously due to several concerns, including recruiting a small sample wherein the vast majority were male participants. There was no control group nor continuation besides using the same set of pre and post-intervention questions to assess participants' speaking abilities. Furthermore, despite different terminology applied, two speaking skills training with technology interventions (Han & Keskin, 2016; Hashim et al., 2019) were found to share the core idea of Lee and Kim (2018) output-based planning strategy, which provided learners with some preparation time before the spoken task, yet they recorded their participants' speech using mobile applications. Moreover, the efficacy of engaging in a communication course (LeFebvre et al., 2020) or using a holographic learning support system (Chen, 2018) to reduce SA remains unclear.

In general, a serious concern with speaking skill training interventions is perhaps attributed to the lack of understanding and ambiguity surrounding what precisely lowered participants' SA and, thus, merits further research to determine what exactly contributed to decreasing learners' SA.This review also found studies

comparing the effectiveness of two interventions concerning SA reduction. When comparing EFT and breathing therapy, Dincer et al. (2020) found the EFT was more effective in reducing SA, as evident by Cohen's effect size. Principally, EFT regulates energy flow by stimulating the meridian points and relaxes an individual while concentrating on emotional reactions causing anxiety. To put it differently, EFT combines "elements of exposure, cognitive therapy and somatic stimulation" (Stapleton, 2020). By contrast, as a form of meditation, breathing therapy regulates breathing by focusing on the mind and respiratory organs (Kuppusamy, Kamaldeen, Pitani, Amaldas, & Shanmugam, 2018).

Even though Dincer et al. (2020) study had a control group and a comparison group, the results still require further investigation because the interventions were compared based on a single session, and no follow-up was conducted. Therefore, to determine the long-term effect, future research can benefit from conducting a longitudinal study. Moreover, Lee and Kim (2018) study compared two strategic planning methods (input-based and output-based planning) and found them effective in alleviating SA over time. Both methods helped learners better organize their thoughts and prepare more than directly engaging in the spoken activity. These strategic planning methods can be applied in a classroom setting without much effort from the instructors (i.e., practicing or training prior to implementation). On the contrary, the current review has identified two studies that used a combination of two interventions. Combining simulation education with problem-based learning reduced nursing students' apprehension regarding communication during group discussions, but not their public SA (Kim et al., 2018). According to Zacarin et al. (2019), a combination of virtual reality exposure and behavioral therapy contributed to decreasing psychological students' SA and elevating their coping behaviors. It would be more beneficial for future research to enhance mitigation of SA by combining multiple interventions; however, these combinations should be well justified and scientifically based.

Surprisingly, negative evidence regarding the effectiveness of SAI was identified. Engaging in an activity-based oral presentation course (Altunkaya, 2018) and using artificial intelligence (chatbots and *Mondly*) (El Shazly, 2021) increased learners' SA. Further research is necessary to examine these interventions' efficacy in other contexts using appropriate procedures and analytic methods with adequate sample size and sufficient duration. In addition, the present review has highlighted the necessity for additional research regarding feedback-oriented intervention as only one study employed teacher feedback to reduce learners' SA (Pontillas, 2020). This method seems quite promising as it provides individualized feedback combined with motivation that considers learners' differences and learning needs besides maintaining their privacy as it is done in a written form. Additional research is required to supply more objective evidence concerning what works best, in which contexts, and why.

Generally, the included studies in this review mostly lack clarity of reporting criteria or factors that were leveraged to justify the appropriateness of their selected interventions prior to embarking on field research. In other words, robust reasons have not been provided in association with intervention suitability for a specific group of learners before embarking on scholarly research. Besides, a general trend with the reviewed studies is associated with unclear negotiation and construction of SA interventions with the educational setting that could compromise their transferability to other contexts and their real-life feasibility. Given this situation, several factors may improve the effectiveness of SA interventions and, thus, save time when searching for anxiety-combatting antidotes that need to be considered.

Based on the review findings, it is highly advisable to consider several issues when selecting and applying various SA reduction interventions. Despite not providing straightforward solutions for SA, some elements offered may aid educators, instructors, and learners in selecting the most appropriate SA reduction interventions to their context. Likewise, a doctor cannot prescribe medicine for patients in the medical sector unless they are diagnosed. The same is perhaps true in the educational field. This implies that knowing what causes learners' SA is probably of high importance. For example, if learners are found to experience SA due to anxiety triggered from facing a crowd, it would be feasible to introduce them to the habituation interventions. In contrast, if SA occurred due to arousal of

negative emotions or negative self-perceptions, it would be conceivable to substitute these emotions and perceptions with more positive ones. English speaking deficiency is another potential element that might significantly contribute to increasing learners' SA. Thus, it is highly recommended to examine learners' S/FL speaking competency before assigning SA reduction intervention.

8. LIMITATIONS

It is undeniable that every study has its limitations, and this review is no exception. The present review is limited to SA interventions published journal articles and conference proceedings between January 2015 and mid-June 2021 and applied in undergraduate educational contexts. Therefore, the omission of potentially relevant research in SA presented in other publication formats such as book chapters and unpublished doctoral thesis from the present review is considered one of the limitations. There have been no replications of most intervention procedures analyzed in this study. Thereby, further research needs to be conducted to ensure the efficacy of these SAI with diverse populations. Moreover, determining some methods' categories was not always straightforward owing to the complexity of SAI nature. Another limitation is associated with analyzing studies published only in English; therefore, no claims are made regarding having a fully comprehensive dataset. Despite these limitations, this systematic review is robust enough to represent accurate and meaningful trends concerning various SA reduction interventions applied in undergraduate education.

9. CONCLUSION

This article provides a systematic review of various SAI employed in undergraduate education and their influence on SA. It shows that SAI are studied by employing various methodological designs, namely experimental quasi-experimental, mixed-methods and qualitative designs. These research designs can provide useful information and insights which can pave the way for developing more sophisticated SA management interventions in future research. The review demonstrated that SAI could be categorized according to their mechanism in dealing with SA to direct and indirect interventions. It is highly hoped that the information presented in this systematic review can assist anxious S/FL learners in identifying the most appropriate SA reduction interventions. This review is believed to lighten the way for and inspire other scholars, educators, and instructors to develop SA management approaches that could create a more relaxed learning environment that suit their learners' individual needs. Finally, based on this study's results, we recommend examining the cause of SA besides the learners' speaking English proficiency levels before selecting or applying any SA reduction approach since these factors can significantly impact the success or failure of SAI.

Funding: This study received no specific financial support.
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: Both authors contributed equally to the conception and design of the study.

REFERENCES

Abbasi, A. M., Khalil, A., & John, S. (2019). English as second language learners' performance correlates of social and academic anxiety. *ELF Annual Research Journal*, *21*(1), 14–81.

Abdurahman, N. H., & Rizqi, M. A. (2020). Indonesian students' strategies to cope with foreign language anxiety. *Teflin Journal*, *31*(1), 1–18.

Akkakoson, S. (2016). Reflections from teachers and students on speaking anxiety in an EFL classroom. *Journal of Language and Cultural Education*, *4*(3), 46-70.Available at: https://doi.org/10.1515/jolace-2016-0025.

Altunkaya, H. (2018). Speech anxiety in guidance and psychological counselling department students. *Cypriot Journal of Educational Sciences*, *13*(3), 328-399.Available at: https://doi.org/10.18844/CJES.V13I3.3764.

Booth-Butterfield, S., & Gould, M. (1986). The communication anxiety inventory: Validation of state-and context-communication apprehension. *Communication Quarterly*, *34*(2), 194-205.

Carl, E., Stein, A. T., Levihn-Coon, A., Pogue, J. R., Rothbaum, B., Emmelkamp, P., . . . Powers, M. B. (2019). Virtual reality exposure therapy for anxiety and related disorders: A meta-analysis of randomized controlled trials. *Journal of Anxiety Disorders*, *61*, 27-36.Available at: https://doi.org/10.1016/j.janxdis.2018.08.003.

Chen, Y. (2018). Reducing language speaking anxiety among adult EFL learners with interactive holographic learning support system. In International conference on innovative technologies and learning (pp. 101-110). Cham: Springer.

Chesham, R. K., Malouff, J. M., & Schutte, N. S. (2018). Meta-analysis of the efficacy of virtual reality exposure therapy for social anxiety. *Behaviour Change*, *35*(3), 152-166.Available at: https://doi.org/10.1017/bec.2018.15.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (2010). The satisfaction with life scale. *Journal of Personality Assessment*, *49*(1), 71-75.

Dincer, B., OzÇelİk, S. K., Zülfünaz, Ö., & BahÇecİk, N. (2020). Breathing therapy and emotional freedom techniques on public speaking anxiety in Turkish nursing students: A randomized controlled study. *Explore*, *18*(2), 226-233.Available at: https://doi.org/10.1016/j.explore.2020.11.006.

El Shazly, R. (2021). Effects of artificial intelligence on English speaking anxiety and speaking performance: A case study. *Expert Systems*, *38*(3), e12667.Available at: https://doi.org/10.1111/exsy.12667.

Foss, K. A., & Reitzel, A. C. (1988). A relational model for managing second language anxiety. *TESOL Quarterly*, *22*(3), 437-454.Available at: https://doi.org/10.2307/3587288.

Fremouw, W. J., & Zitter, R. E. (1978). A comparison of skills training and cognitive restructuring-relaxation for the treatment of speech anxiety. *Behavior Therapy*, *9*(2), 248-259.Available at: https://doi.org/10.1016/s0005-7894(78)80110-5.

Galti, A. (2017). Awareness of students' on the use of affective strategy and their level of speaking anxiety. *International Journal of Multidisciplinary Research and Dedvelopment*, *3*(3), 2349-4182.

Genc, G., Kulusakli, E., & Annual, S. A. (2016). *Foreign language speaking anxiety and anxiety coping strategies employed by Turkish EFL learners*. Paper presented at the Proceedings of 9th Annual International Conference of Education.

Gosiewska-Turek, B. (2018). The impact of anxiety on speaking in adolescent and adult groups of English learners. *Journal of Education Culture and Society*, *9*(2), 93–106.Available at: https://doi.org/10.15503/jecs20182.93.106.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*(2), 348–362.Available at: https://doi.org/10.1037/0022-3514.85.2.348.

Hammad, E. A., & Ghali, E. M. A. (2015). Speaking anxiety level of Gaza EFL pre-service teachers: Reasons and sources. *World Journal of English Language*, *5*(3), 52–64.

Han, T., & Keskin, F. (2016). Using a mobile application (WhatsApp) to reduce EFL speaking anxiety. *Gist: Education and Learning Research Journal*(12), 29-50.

Hart, T. A., Flora, D. B., Palyo, S. A., Fresco, D. M., Holle, C., & Heimberg, R. G. (2008). Development and examination of the social appearance anxiety scale. *Assesment*, *15*(1), 48-59.

Hashim, H., Yunus, M., & Hashim, H. (2019). 3-minutes pitching with flip grid: An antidote of innovation for speaking anxiety. *International Journal of Innovative Technology and Exploring Engineering*, *8*(7), 1798-1801.

Hofmann, S. G., & DiBartolo, P. M. (2000). An instrument to assess self-statements during public speaking: Scale development and preliminary psychometric properties. *Behavior Therapy*, *31*(3), 499-515.Available at: https://doi.org/10.1016/s0005-7894(00)80027-1.

Hong, Q. N., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., Dagenais, P., . . . Pluye, P. (2018). The Mixed Methods Appraisal Tool (MMAT) version 2018 for information professionals and researchers. *Education for Information*, *34*(4), 285–291.Available at: https://doi.org/10.3233/EFI-180221.

Horwitz, E. K. (1990). *Attending to the affective domain in the foreign language classroom. In S. S. Magnan (Ed.), Shifting the instructional focus to the learner*. Paper presented at the Middlebury: Northeast Conference on the Teaching of Foreign Languages.

Horwitz, E. K., Horwitz, M. B., & Cope, J. (1986). Foreign language classroom anxiety. *The Modern Language Journal*, *70*(2), 125-132.Available at: https://doi.org/10.2307/327317.

Huashan, W. (2019). Chinese TESOL students' perception of their speaking anxiety in workshops. *Journal of Language and Cultural Education*, *7*(2), 21-50.Available at: https://doi.org/10.2478/jolace-2019-0010.

Jiménez, Ó., Ramos, N. S., González-Moraleda, Á., & Resurreccion, D. M. (2020). Brief mindfulness-based interventions in a laboratory context: A systematic review of randomized controlled trials. *Mindfulness*, *11*(4), 849-861.Available at: https://doi.org/10.1007/s12671-020-01320-x.

Kasap, S. (2019). Anxiety in the EFL speaking classrooms. *The Journal of Language Learning and Teaching*, *9*(2), 23-36.

Kearney, J., & Ellis, R. (1995). *The study of second language acquisition. In TESOL Quarterly* (Vol. 29). Oxford: Oxford University Press.

Khusnia, A. N. (2016). Students' Perspectives on speaking anxiety in the english foreign language classroom. *Ahmad Dahlan Journal of English Studies*, *3*(2), 41-52.Available at: https://doi.org/10.26555/adjes.v3i2.4988.

Kilic, N., Eryilmaz, A., & Dinç, S. Y. (2018). Effectiveness of psychoeducational group training on Turkish EFL learners' English speaking anxiety. *Journal of Hacettepe University Faculty of Education*, *33*(4), 1020-1037.

Kim, Y.-H., Hwang, K.-H., & Cho, O.-H. (2018). Simulation education with problem-based learning: Effect on nursing students' communication apprehension. *Social Behavior and Personality: An International Journal*, *46*(1), 151-160.Available at: https://doi.org/10.2224/sbp.6906.

Koch, A., & Terrell, T. D. (1991). In E K Horwitz & D. J. Young (Eds.), Language anxiety: From theory and research to classroom implications (pp. 109–126). Englewood Cliffs, NJ: Prentice Hall.

Kondo, D. S., & Ying-Ling, Y. (2004). Strategies for coping with language anxiety: The case of students of English in Japan. *Elt Journal*, *58*(3), 258-265.Available at: https://doi.org/10.1093/elt/58.3.258.

Kuppusamy, M., Kamaldeen, D., Pitani, R., Amaldas, J., & Shanmugam, P. (2018). Effects of Bhramari Pranayama on health–a systematic review. *Journal of Traditional and Complementary Medicine*, *8*(1), 11-16.Available at: https://doi.org/10.1016/j.jtcme.2017.02.003.

Leary, M. R. (1983a). Social anxiousness: The construct and its measurement. *Journal of Personality Assessment*, *47*(1), 66-75.Available at: https://doi.org/10.1207/s15327752jpa4701_8.

Leary, M. R. (1983b). A brief version of the fear of negative evaluation scale. *Personality and Social Psychology Bulletin*, *9*(3), 371–375.

Leary, M. R., & Kowalski, R. M. (1993). The interaction anxiousness scale: Construct and criterion-related validity. *Journal of Personality Assessment*, *61*(1), 136-146.Available at: https://doi.org/10.1207/s15327752jpa6101_10.

Lee, D., & Kim, S.-Y. (2018). Effects of input-and output-based planning on Korean college students' communication strategy and speaking anxiety. *Journal of Asia TEFL*, *15*(4), 959–975.Available at: https://doi.org/10.18823/asiatefl.2018.15.4.5.959.

LeFebvre, L., LeFebvre, L. E., Allen, M., Buckner, M. M., & Griffin, D. (2020). Metamorphosis of public speaking anxiety: Student fear transformation throughout the introductory communication course. *Communication Studies*, *71*(1), 98-111.Available at: https://doi.org/10.1080/10510974.2019.1661867.

Levett-Jones, T., McCoy, M., Lapkin, S., Noble, D., Hoffman, K., Dempsey, J., . . . Roche, J. (2011). The development and psychometric testing of the Satisfaction with Simulation Experience Scale. *Nurse Education Today*, *31*(7), 705-710.Available at: https://doi.org/10.1016/j.nedt.2011.01.004.

Liebowitz, M. R. (1987). *Social Phobia*. New York: Guilford Publications.

Lu, H. W., Lee, J.-Y., & Lin, M. H. (2019). Effects of authentic English-language videos on EFL students' speaking anxiety. *International Journal of Information and Education Technology*, *9*(6), 423-428.Available at: https://doi.org/10.18178/ijiet.2019.9.6.1239.

MacIntyre, P. D. (2017). In G. Gkonou, M. Daubney, & J. Dewaele (Eds.), New insights into language anxiety: Theory, research and educational implications (pp. 11–30). Bristol: Multilingual Matters.

Mays, N., Pope, C., & Popay, J. (2005). Systematically reviewing qualitative and quantitative evidence to inform management and policy-making in the health field. *Journal of Health Services Research & Policy*, *10*(1_suppl), 6-20.Available at: https://doi.org/10.1258/1355819054308576.

McCroskey, J. C. (1970). Measures of communication-bound anxiety. *Speech Monographs*, *37*(4), 269–277.

McCroskey, J. C., Beatty, M. J., Kearney, P., & Plax, T. G. (1985). The content validity of the PRCA-24 as a measure of communication apprehension across communication contexts. *Communication Quarterly*, *33*(3), 165-173.Available at: https://doi.org/10.1080/01463378509369595.

Milan, M. C. (2019). English speaking anxiety: Sources, coping mechanisms, and teacher management. *PUPIL: International Journal of Teaching, Education and Learning*, *3*(2), 1–28.

Milosevic, I., & McCabe, R. (2015). *Phobias the psychology of irrational fear*. Santa Barbara: ABC-CLIO.

Miskam., N. N., & Saidalvi, A. (2019). Investigating English language speaking anxiety among Malaysian undergraduate learners. *Asian Social Science*, *15*(1), 1-7.Available at: https://doi.org/10.5539/ass.v15n1p1.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & Group., T. P. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA Statement. *PLOS Medicine*, *6*(7), 1–7.

Nakatani, Y. (2006). Developing an oral communication strategy inventory. *The Modern Language Journal*, *90*(2), 151-168.Available at: https://doi.org/10.1111/j.1540-4781.2006.00390.x.

Nazligul, M. D., Yilmaz, M., Gulec, U., Yilmaz, A., Isler, V., O'Connor, R. V., . . . Clarke, P. (2019). Interactive three-dimensional virtual environment to reduce the public speaking anxiety levels of novice software engineers. *IET Software*, *13*(2), 152-158.Available at: https://doi.org/10.1049/iet-sen.2018.5140.

Oxford, R. (1990). *Language learning strategies: What every teacher should know*. Boston, Massachusetts: Heinle and Heinle Publishers.

Parker, L. E. (1993). When to fix it and when to leave: Relationships among perceived control, self-efficacy, dissent, and exit. *Journal of Applied Psychology*, *78*(6), 949.Available at: https://doi.org/10.1037/0021-9010.78.6.949.

Pluye, P., & Hong, Q. N. (2014). Combining the power of stories and the power of numbers: Mixed methods research and mixed studies reviews. *Annual Review of Public Health*, *35*(1), 29-45.Available at: https://doi.org/10.1146/annurev-publhealth-032013-182440.

Pontillas, M. S. D. (2020). Reducing the public speaking anxiety of ESL college students through popsispeak. *3L, Language, Linguistics, Literature*, *26*(1), 91–105.Available at: https://doi.org/10.17576/3l-2020-2601-07.

Ramamuruthy, V. (2019). The effects of task-based approach on speaking anxiety among ESL low proficiency diploma students. *Universal Journal of Educational Research*, *7*(6), 1363-1375.Available at: https://doi.org/10.13189/ujer.2019.070604.

Rathus, S. A. (1973). A 30-item schedule for assessing assertive behavior. *Behavior Therapy*, *4*(3), 398-406.Available at: https://doi.org/10.1016/s0005-7894(73)80120-0.

Saputra, J. B. (2018). An analysis of students' speaking anxiety toward their speaking skill. *Premise: Journal of English Education*, *7*(1), 111-123.Available at: https://doi.org/10.24127/pj.v7i1.1334.

Siddaway, A. P., Wood, A. M., & Hedges, L. V. (2019). How to do a systematic review: A best practice guide for conducting and reporting narrative reviews, meta-analyses, and meta-syntheses. *Annual Review of Psychology*, *70*(1), 747-770.Available at: https://doi.org/10.1146/annurev-psych-010418-102803.

Sinaga, A. G. H., Syahrial, S., & Hati, G. M. (2020). Students' speaking anxiety in English Class. *Jadila: Journal of Development and Innovation in Language and Literature Education*, *1*(1), 44-56.

Spielberger, C. D. (1983). *Manualfor the stale-trait anxiety inventory (Form Y)*. Palo Alto, CA: Consulting Psychologists Press.

Stapleton, P. (2020). In C. L. Fracasso, S. Krippner, & H. L. Friedman (Eds.), Holistic treatment in mental health: A handbook practitioner's perspectives (pp. 136–151). Jefferson, North Carolina: McFarland Publishers.

Stupar-Rutenfrans, S., Ketelaars, L. E., & van Gisbergen, M. S. (2017). Beat the fear of public speaking: Mobile 360 video virtual reality exposure training in home environment reduces public speaking anxiety. *Cyberpsychology, Behavior, and Social Networking*, *20*(10), 624-633.Available at: https://doi.org/10.1089/cyber.2017.0174.

Toyama, M., & Yamazaki, Y. (2021). Classroom interventions and foreign language anxiety: A systematic review with narrative approach. *Frontiers in Psychology*, *12*, 80.Available at: https://doi.org/10.3389/fpsyg.2021.614184.

Wang, J., Yang, H., Shao, R., Abdullah, S., & Sundar, S. S. (2020). *Alexa as coach: Leveraging smart speakers to build social agents that reduce public speaking anxiety*. Paper presented at the Conference on Human Factors in Computing Systems - Proceedings.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063–1070.Available at: https://doi.org/10.1037/0022-3514.54.6.1063.

Widhayanti, Z. (2018). English department students' learning strategies to overcome speaking anxiety. *RETAIN*, *6*(2), 60–67.

Wilang, J. D., & Vo, T. D. (2018). The complexity of speaking anxiety in a graduate EFL classroom. *Journal of Asia TEFL*, *15*(3), 682–699.Available at: https://doi.org/10.18823/asiatefl.2018.15.3.8.682.

Wolpe, J., & Lazarus, A. A. (1966). *Behavior therapy techniques: A guide to the treatment of neuroses*: Pergamon Press.

Wolpe, J. (1969). *The practice of behavior therapy* (2nd ed.). New York: Pergamon Press.

Woodrow, L. (2006). Anxiety and speaking english as a second language. *RELC Journal*, *37*(3), 308–328.Available at: https://doi.org/10.1177/0033688206071315.

Yaman, H., & Sofu, M. S. (2013). Development of speech anxiety scale for teacher candidates. *Turkish Social Researches Magazine*, *17*(3), 41–50.

Yasuda, T., & Nabei, L. (2018). Effects of coping strategies on language anxiety of Japanese EFL learners: Investigating willingness to communicate. *Journal of Language Teaching & Research*, *9*(5), 905–915.Available at: https://doi.org/10.17507/jltr.0905.03.

Young, D. J. (1991). Creating a low-anxiety classroom environment: What does language anxiety research suggest? *The Modern Language Journal*, *75*(4), 426-439.Available at: https://doi.org/10.1111/j.1540-4781.1991.tb05378.x.

Zacarin, M. R. J., Borloti, E., & Haydu, V. B. (2019). Behavioral therapy and virtual reality exposure for public speaking anxiety. *Trends in Psychology*, *27*(2), 491-507.Available at: https://doi.org/10.9788/TP2019.2-14.

Zhiping, D., & Paramasivam, S. (2013). Anxiety of speaking English in class among international students in a Malaysian university. *International Journal of Education and Research*, *1*(11), 1-16.Available at: https://doi.org/10.5539/ass.v17n11p207.