

The Effectiveness of NLP on Anxiety and Social Anxiety: A Narrative Literature Review

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A List of Abbreviations

ACT: Acceptance and Commitment Therapy

APA: American Psychological Association

CBT: Cognitive Behavioral Therapy

DASS-21: Depression, Anxiety, and Stress Scale - 21

GAD: generalized anxiety disorder

ICD: International Classification of Diseases

NLP: Neuro-Linguistic Programming

NLPt: Neuro-Linguistic Psychotherapy

PsycINFO: a database of abstracts of literature in the field of psychology. It is produced by the American Psychological Association

PTSD: Post Traumatic Stress Disorder

RCT: Randomized Controlled Trial

SAD: Social anxiety disorder

SRS: Single Subject Research

SSR drugs: Selective serotonin reuptake inhibitors

WHO: World Health Organization

Glossary of Terms

A-B-A-B approach: A single-subject research method that assesses the impact of interventions by alternating their use in two consecutive phases (A-B-A-B), allowing for the evaluation of intervention effectiveness by comparing outcomes across different phases.

Boolean Logic: A form of logic used in information retrieval, utilizing logical operators such as "OR," "AND," and "NOT" to perform more precise and efficient searches in databases or search engines.

Control group: A group in a research study that is not exposed to the tested intervention or variables. The control group is used as a comparison to evaluate the effects of interventions or treatments.

DASS-21 scale: A questionnaire that assesses an individual's levels of depression, anxiety, and stress. It is a self-report measure designed to evaluate psychological distress and emotional states.

Delphi survey: A research method involving multiple rounds of questions presented to a panel of experts, collecting their views and opinions anonymously. The aim is to achieve consensus and forecast future events or decisions.

Epistemology: The study of knowledge, beliefs, and how we acquire and validate knowledge.

ICD-10: The current International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, is still in use in Finland and several other countries, and it includes 14,400 codes for diseases, injuries, and causes of death.

ICD-11: The latest International Statistical Classification of Diseases and Related Health Problems, Eleventh Revision, published by the World Health Organization (WHO) in 2022, is a global list that includes all identified diseases and health problems, with 55,000 codes for diseases, injuries, and causes of death.

Methodology: The systematic approach and set of techniques used in research or practice to gather and analyse data and information.

Placebo: A pharmacologically inert substance used as a control in double-blind studies of active medications, where some participants receive the actual medication and others receive the placebo.

The placebo effect: Refers to the phenomenon where a patient's symptoms or improvement in condition are due to their belief in the treatment or medication, even if it is just an inactive substance or intervention.

Post-test: A follow-up assessment conducted after the interventions or treatments in a research study. The post-test measures participants' changed conditions or effects as a result of the interventions or treatments.

Pre-test: An initial assessment conducted before the actual intervention or treatment in a research study. The pre-test measures participants' baseline levels on the variables of interest and serves as a baseline for comparison with post-treatment results.

Quasi-experimental study: A research design that resembles an experimental study, but the researcher cannot fully control the assignment of participants to groups or variables. This type of research aims to investigate cause-and-effect relationships without a fully randomized experimental design.

Randomized, single-blind clinical trial: A study design in which participants and/or researchers are unaware of who receives the investigational treatment (intervention) and who receives the control group treatment. Participants are randomly assigned to different treatment groups, helping to reduce biases, and enabling better comparison of treatments.

Semi-experimental study: A research design in which the researcher has some control over the study design, but it does not fully meet the criteria of a randomized controlled trial.

Single Subject Research: A research method that focuses on an individual participant or case to closely examine the impact of a specific intervention.

Socio-economic factors: Societal and economic factors, such as income level, educational attainment, occupation, and social status, that influence an individual's or a group's living conditions and way of life.

Technology: Refers in the context of NLP to the tools, methods, or applications used to facilitate and enhance processes or activities.

Abstract

The aim of this research is to map and evaluate recent studies on the impact of Neuro-Linguistic Programming (NLP) on the treatment of anxiety and social anxiety. The review aims to identify potential knowledge gaps and challenges in using NLP in research and to find future research topics. Suitable databases were used to source the studies used. As a result of the searches, 8 studies relevant to the topic were found. The results consistently suggest that NLP is an effective method for reducing anxiety and social anxiety, however, there is limited information about the long-term effects of NLP interventions.

1. Introduction

According to the World Health Organization (WHO) (WorldHealthOrganization, 2017) anxiety disorder is the most common mental health disorder globally, and it is more prevalent in women than men. They estimated that in 2015 approximately 264 million people, roughly 3.6% of the world's population, suffered from anxiety disorders. This represents a 14.9% increase since 2005, primarily due to population growth and aging. 2 years after the onset of the COVID-19 pandemic, (WHO 03/2022) reported that cases of anxiety and depression had increased by 25% in the first year of the pandemic. Furthermore, in a WHO press release (06/2022), it is reported that the number of people suffering from anxiety disorders has risen to 301 million. These research findings highlight how global crises experienced in recent years, such as COVID-19, the war in Ukraine, and climate change, have strained people's mental health and increased anxiety.

The Health2000 study (THL, 2023) conducted in Finland estimated that approximately 12.6 % of young adults had experienced an anxiety disorder at some point in their lives. It is important to note that this study was conducted before the COVID-19 pandemic. Despite Finland being repeatedly ranked as the World's Happiest Country (WHR, 2023), mental health disorders, including anxiety, are still rising. The Finnish Institute for Health and Welfare (THL, 2023) reports that over the past five years, the psychological burden on working-age Finns has significantly increased. In 2022, approximately 19% of men and 20% of women reported significant psychological distress. This represents a notable increase compared to the figures from 2018 when the corresponding numbers were 13% for both genders.

As has been noted, the number of people suffering with mental health issues and anxiety has increased globally. In Finland alone the costs of mental health disorders are estimated to be 11 billion euros per year (Mental Health Finland, 2023). For decades, medication and cognitive behavioral therapy (CBT) have been used to treat anxiety. In this context, NLP has been shown to

produce positive results when used as a treatment, but the amount of research is limited, and more research and experimentation should be conducted.

2. Theory of anxiety and social anxiety

In this section, anxiety-related concepts are defined, followed by a closer examination of the definition, symptoms, and treatment of anxiety.

2.1 Definitions of anxiety

Anxiety is associated with several emotions (DuodecimHealthLibrary, 2023), and the most common ones linked to the experience of anxiety are fear and worry. American Psychological Association (APA)(APA, 2023) defines anxiety as an emotional state in which a person feels vague tension and anxiety, anticipating some kind of danger, disaster, or accident in the future.

When anxiety persists for a long time, and causes significant impairment to the individual, it is referred to as Generalized Anxiety Disorder (GAD) (NationalInstituteForHealthAndCareExcellence, 2014). In the ICD-10 classification (WorldHealthOrganization, 2017), GAD is described as a long-term excessive anxiety and worry related to multiple concerns lasting for at least 6 months, which can be characterized as apprehensive anticipation (Lönnqvist et al., 2021, pp. 117-119).

Social anxiety disorder (SAD) is a condition where intense fear and anxiety in social situations persists for months, impacting various aspects of an individual's life. It is characterized by recurring extreme discomfort in social activities like conversations, public performance, or situations where one feels observed, like dining with others (WorldHealthOrganization, 2023). Individuals with this disorder fear negative evaluation and revealing signs of anxiety, leading to the avoidance or extreme fear in social situations (ADAA, 2023). In another definition, given by the National Collaborating Centre for Mental Health (NCCMH) (2013), they describe social anxiety as a condition in which an individual experiences intense and ongoing fear in social situations where they may feel humiliated.

The term "social phobia", now referred to as social anxiety, was officially recognized as a separate phobic disorder in the mid-1960s in a study by Marks & Gelder (1965). Reference is made to the study in the NCCMF guidelines (2013). Social anxiety usually begins in adolescence, between the ages of 10 to 17. The disorder is often chronic, and the severity of its symptoms can vary according to life situations (Ranta, 2020).

2.2 Symptoms of anxiety

Anxiety activates the sympathetic nervous system in the body, resulting in various physical symptoms such as rapid heart rate, high blood pressure, dry mouth, shortness of breath, sweating, trembling, and dizziness (Viikki & Leinonen, 2015). Gastrointestinal symptoms like diarrhea, nausea, and heartburn are also commonly associated with anxiety. Anxiety can disrupt sleep and cause difficulties in concentration (DuodecimHealthLibrary, 2023). Lönnqvist et al. (2021, p. 119) states that in some cases, individuals may even believe that these physical symptoms are the primary disorder, not realizing that they are merely symptoms of underlying anxiety. Symptoms and avoidance behavior impair social functioning and can lead to panic attacks (World Health Organization, 2019). Social anxiety can present as a range of symptoms, including blushing, sweating, trembling of hands, nausea, heart palpitations, or an urgent need to use the restroom. If left untreated, sometimes, these symptoms can become so severe that they lead to panic attacks (NHS, 2023).

2.3 Causes of anxiety

Anxiety can stem from various factors such as life situations, external influences, and internal conflicts. Individuals experience anxiety in different ways due to both biology and learning experiences related to environmental factors. Individuals can experience situational anxiety (state anxiety) or persistent anxiety (trait anxiety) (Lönnqvist et al., 2021, p. 117-119).

Rich (2023) consolidates the causes for the recent surge in social anxiety in her article. She emphasizes the growing popularity of social media as a primary factor, as it reduces face-to-face interactions. Young people are particularly susceptible to social anxiety, partly because they are beginning to use social media at increasingly younger ages and are generally more predisposed to this disorder. Societal shifts have redirected people's focus towards materialism, increasing pressures related to appearance and financial standing. The pandemic has further accentuated this trend by limiting typical social interactions. The rise of technology, like Zoom meetings and social media, has led many to become accustomed to limited personal interaction, and as a consequence, face-to-face meetings might induce heightened anxiety.

Factors believed to contribute to anxiety include genetic factors, predisposing personality traits, other psychiatric disorders, and environmental factors (CurrentCareGuidelines, 2019). Other factors that can contribute to anxiety include difficult experiences and traumas in childhood, current life situations, physical and mental health problems, certain medications, and substance abuse can also trigger anxiety (Mind, 2023). In addition to external events, internal factors that contribute to the worry that accompanies the experience of anxiety are our beliefs and cognitive processes, such as self-criticism, rumination, focusing on negative aspects, and anticipating negative outcomes (Britton, 2016, p. 30). Kurusheva & Riswadkar (2017) bring an NLP perspective to the

discussion, suggesting that the "structure" of our experiences, including the experience of anxiety, is composed through our senses, the language of the brain that we use in our thinking. Imagery, sounds, internal dialogue, bodily sensations, posture, and facial expressions, as well as smells and tastes, can all impact anxiety. (Kurusheva & Riswadkar, 2017, p. 28).

2.4 Treatment methods of anxiety

According to the current Finnish Current Care Guidelines (2019), the recommended primary treatments for generalized anxiety disorder are cognitive-behavioral therapy (CBT), pharmacotherapy, or a combination of both. In cognitive therapy, the aim is to identify harmful thought patterns and limiting beliefs, as well as emotional reactions and somatic sensations, and to modify them to become more flexible (Karila, et al., 2020, p. 23). CBT is built from several different specific techniques and approaches. In traditional behavioral therapy, the importance of conditioning and associations in the formation of symptoms is emphasized. In therapy, people are helped to manage frightening situations through exposure and reinforcing desired behavior through rewards. The focus in behavior therapies is on the analysis of modes of operation and behavior Lönnqvist et al. (2021, p. 913).

The research review indicated that all treatment methods, including medications, exercise, psychotherapy, and placebos, can be equally effective in treating anxiety disorders. An interesting observation was that computer-assisted cognitive behavioral therapy (CBT) can be helpful in treating mild to moderate anxiety, while therapist-directed face-to-face treatments were clinically superior (Mangolini, et al., 2019). On the other hand, Pauley et al. (2021) found that digital interventions are effective in the treatment of anxiety disorders, and when comparing digital interventions to face-to-face interventions, no significant difference in effectiveness was found. Mangoldini et al. (2019) also noted that some short-term psychodynamic therapies showed positive outcomes, and the benefits of exercise in reducing anxiety symptoms were clear and effective, regardless of the type or intensity of physical activity. Similar findings were reported by Henrikson et al. (2021), demonstrating the effectiveness of a 12-week group exercise program in treating anxiety among patients in primary care. In conclusion, there are various approaches to treating anxiety, and I believe their effectiveness is influenced by the individual experiencing anxiety, the healthcare provider, and their interactions.

3. Theory and practice of NLP

In this chapter, the theoretical foundations of NLP are examined, and NLP interventions used in the studies are presented.

3.1 Definition of NLP

NLP is a behavioral science and model that examines the structure of subjective experience and how the collaboration between the brain (neuro), language (linguistic), and body influences our "programming" (Dilts & Delozier, 2000, p. 849) meaning learned and recurring behavior and strategies that guide us in different situations. It is about what and how we have learned to think and, as a result, react, act, and how by changing our thinking, for example, we can achieve better.

3.2 Description of the history and development of NLP

NLP originated in the 1970s when Richard Bandler and John Grinder became interested in how individuals achieved excellence and produced outstanding results. (O'Connor, 2002, p. 2). NLP expanded rapidly beyond the framework of therapy and emerged as its own field of study, exploring the structure of subjective experience and how it can be transformed. Over the years, NLP has evolved with contributions from various practitioners. In the 1980s and 1990s, development was extensive and rapid, with old models being refined and new ones developed (Hämeenaho, 2000, p. 29).

The roots of NLP lie in epistemology, methodology, and technology (Dilts & Delozier, 2000, p. 849). NLP's approach is practical and focuses on how people construct and understand their experiences. NLP methodology refers to processes and techniques such as modeling, which was the starting point of NLP. NLP is also associated with ethics, and ethical guidelines have been created for NLP professionals to provide a framework that encourages NLP practitioners to act sincerely, honestly, fairly, respectfully, appreciatively, and responsibly towards other people. (International Association for NLP, 2023).

3.3 The NLP perspective on anxiety

In the NLP framework, the approach to anxiety is practical, focusing on how individuals construct and understand their experiences (Dilts & Delozier, 2000, p. 1000). From an NLP perspective, the brain's ability to experience anxiety is seen as a sign of healthy brain function, as anxiety is an important reaction in life-threatening situations. However, if anxiety becomes a part of everyday life where there is usually no imminent danger, it can be seen as a program performed by the brain that is not suitable for the situation. In NLP, anxiety is considered as something that people do, not something they are or have. Understanding how the brain creates the experience of unwanted anxiety makes it surprisingly simple to transform it into something else (Kurusheva & Riswadkar, 2017, p. 6).

3.4 Use of NLP as a therapeutic approach

Neuro-Linguistic Psychotherapy (NLPt) has been a recognized therapeutic approach since the 1980s, and it has been accepted by various psychotherapy associations around the world (EANLPt, n.d.) . There is some emerging evidence that NLPt can facilitate good therapeutic outcomes with clients seeking psychotherapy (de Rijk, et al., 2022, p. 84).

NLP presents a contrasting approach to traditional methods in diagnosing and treating mental health issues (Gray, 2022). Traditional models, as described by Gray (2022, p. 68), largely rely on patient self-reported symptoms and biological mechanisms. This dependence often leads to numerous diagnostic classifications, many of which overlap, making symptom differentiation unclear. Consequently, treatments derived through this method are not as precisely targeted. On the other hand, NLP, as depicted by Wake & Leighton (2014), emphasizes a client-centered approach. Their study examining the impact of NLP interventions on PTSD symptoms among military and emergency service clientele offers an illustrative example. While each participant exhibited unique symptoms, varied treatment histories, and distinct needs, NLP enabled tailored interventions based on individual symptoms and practitioner expertise. A pivotal takeaway, as underscored by Wake & Leighton, is that different NLP interventions can lead to similar positive outcomes (Wake & Leighton, 2014, p. 258). Comparing traditional diagnosis and NLP, Gray (2022, p. 68) emphasizes that NLP is oriented towards understanding individuals' subjective "maps" influencing their behavior. The therapeutic journey involves identifying and refining these mental representations, enabling clients to craft more stable and health-promoting internal perceptions. In conclusion, while traditional methods may appear broad and somewhat imprecise due to overlapping diagnostic classifications, NLP offers a more personalized and detailed approach, focusing on an individual's unique mental structures.

3.5 Criticisms and challenges in the use of NLP as a therapeutic approach

For nearly half a century, researchers have investigated the efficacy of NLP, yet its effectiveness remains a subject of debate. One of the primary challenges in standardizing NLP research stems from its diverse range of principles, techniques, and tools (de Rijk, et al., 2019, p. 5). In their study, Kotera & Sweet (2019) delved into the reasons behind the limited scientific evidence supporting NLP. They identified several pertinent concerns. Often, evaluations focus on discrete NLP elements rather than considering the approach as a holistic system, leading to the oversight of pivotal models such as the Meta Model. A notable proportion of evaluators possess insufficient NLP training, and it is not uncommon for NLP interventions in research to be implemented by professionals lacking appropriate qualifications. Furthermore, numerous studies exhibit

shortcomings in their design and reporting, exacerbated by the omission of crucial information, thereby posing varying degrees of bias risk. As a result, a significant number of these studies, characterized by their medium to weak quality, face challenges in conclusively demonstrating NLP's efficacy (Kotera & Sweet, 2019).

Kotera et al. (2022) also highlight the ethical challenges related to NLP research and practice. These challenges relate to the definition of NLP, its boundaries in relation to other approaches, and the unpreparedness in situations where NLP interventions do not work. These factors have implications for practical work as well as for the design, implementation, and interpretation of research. The lack of consistent and standardized training, and the resulting variation in the quality of training, contribute to the criticism surrounding NLP. There are differences in the skills of individuals who have studied NLP, which can even lead to unethical practices (Kotera & Sweet, 2019, p. 751). Although an ethical guidance for NLP (IANLP, 2023) exists, its implementation and enforcement are not monitored. NLP training programs focus on what works, but this approach may not provide sufficient knowledge and skills to handle situations where NLP interventions do not produce the desired results (Kotera et al., 2022).

4. Methodology

The research was conducted as a narrative literature review, as it enables the determination of the prevalence of a phenomenon, key concepts, and their interrelationships, and offers an overview of the subject at hand (Kangasniemi, et al., 2013). A narrative review is more flexible than other types of reviews in terms of information retrieval and the definition of selection criteria (Fan, et al., 2022). An integrative review is suitable for a subject that has been heavily researched (Sethares, 2020) and as my chosen topic has not, this option was ruled out.

4.1 Literature search

Table 1 shows the databases used and search criteria. Boolean logic (Booth, et al., 2016, p. 118) was used with keywords. The number of studies found, how many were examined at an abstract level, full text and selected studies are also shown in the table.

Table 1 Literature search and selection

Database	Search Criteria	Key Word Search Strategy	Total Results	Abstract level	Full text	Selected
PubMed	Free full-text, last 5 years (2017-2023), written in English	((((((((((("anxiety") OR ("anxiety disorder")) OR ("generalized anxiety disorder")) OR ("GAD")) OR ("social anxiety")) OR ("social phobia")) AND ("neuro linguistic programming")) OR ("neuro-linguistic programming")) OR ("neuro linguistic psychotherapy")) OR ("NLPt")) OR ("neuro lingvistinen ohjelmointi")) NOT ("natural language processing"))	4	2	1	1
ScienceDirect	2017-2023, Review articles, open access/open archive	("neuro linguistic programming" OR "neuro-linguistic programming") AND ("anxiety" OR "anxiety disorder" OR "social anxiety" OR "Social phobia" OR "generalized anxiety disorder")	8	1	1	1
ProQuest	2017-2023, in ABSTRACT, Peer reviewed / Full text	("neuro linguistic programming" OR "neuro-linguistic programming") AND ("anxiety" OR "anxiety disorder" OR "social anxiety" OR "Social phobia" OR "generalized anxiety disorder")	85	10	2	2
Google Scholar	2017-2023, Key words in the title, review articles	("NLP" OR "neuro linguistic programming" OR "neuro-linguistic programming" OR "neurolinguistic programming")AND ("anxiety" OR "anxiety disorder" OR "social anxiety" OR "Social phobia" OR "generalized anxiety disorder") NOT ("natural language processing")	65	4	3	2
Google	The first two pages	"neuro linguistic programming" AND "social anxiety" pdf	20	3	1	1
Library of Uni of Wales	2017-2023, peer reviewed, open access, written in English	"NLP" OR "neuro-linguistic programming" OR "neuro linguistic programming" AND "anxiety" OR "social anxiety"	26	5	2	1

5. NLP in the treatment of anxiety and social anxiety: Recent studies

In this section the studies shown in Table 2 and Table 3 will be compared. Afterward, I will compare the approaches and results of these studies to each other and focus on a more detailed analysis of Study VIII.

5.1 Literature selection

After the initial database search, duplicate studies were removed. Subsequently, study titles and abstracts were examined, and studies deemed irrelevant were excluded. The remaining studies were assessed in their entirety and included in the review if they met all inclusion criteria.

The following information was extracted from all included studies: authors, year, country, name of the study, what was studied, how the study was conducted, outcome of the study and metrics.

Final selection of the studies is in Table 2 and Table 3.

Table 2 Details of included studies I - IV

	Authors, year, country	Name of the study	What was studied?	How study was conducted?	Outcome of the study	Metric
I	Daharnis et al. 2019, Indonesia	The Impact of NLP on Anxiety Related to Mathematics Teaching in Elementary School Graduates.	How can NLP be used to alleviate anxiety related to teaching mathematics?	4 x NLP intervention: Used interventions were not specified. Target group of 8 prospective elementary school teachers. No control group.	From the results of graphical analysis in groups can be concluded that NLP is effective to reduce the mathematic anxiety level of prospective elementary teachers.	Mini Mathematic Anxiety Scale (MMAS) and observation
II	Saleh & Amirudin, 2020, Malaysia	The Impact of NLP's Disney Strategy on the Reduction of Mathematics Anxiety.	How does NLP's Disney Strategy affect to mathematics anxiety?	Target group of 40 students, divided to experimental and control groups. Experimental group used Strategy DisneyNLP strategy and control group used conventional methods.	Finding indicates that there was a significant difference in the post-test scores between the control and experimental groups. The results of this analysis show that teaching using the Strategy DisneyNLP effectively reduces student math anxiety levels.	Abbreviated Math Anxiety Scale (AMAS).
III	Anjomshoaa, Moharer & Shirazi, 2021, Iran	The Effects of NLP and Cognitive Behavioral Therapy on Student Anxiety, Depression, and Stress.	How do NLP and cognitive behavioral therapy impact students' experience of anxiety, depression, and stress?	45 individuals (ages 15-18, from both genders equally) were chosen as the sample (group); they were divided in three groups, each group consisting of 15 individuals. The experimental group 1 was taught the guidelines of NLP in 18 sessions, 45 minutes each. The experimental group 2 was taught CBT in 6 sessions, 60 minutes each. The control group didn't receive any specific training.	The findings demonstrated that NLP and CBT-based trainings had significant impacts on the decline of depression. Furthermore, the degrees of impact of Neuro-Linguistic programming's guidelines and CBT on anxiety, depression and stress decline among students were not significantly different.	DASS-21 scale
IV	Doğan, Doğan & Bağcı, 2022, Turkey	The Effects of NLP on Depression, Anxiety, and Stress in Liver Transplant Patients.	How do NLP interventions affect depression, anxiety, and stress?	84 voluntary liver transplant patient were divided experimental group (42) and control group (42). During the 28 days sub-modality technique of NLP was applied once. Afterwards, NLP was applied 4 times in total, with one-week intervals.	A statistically significant difference was found between the experimental and control groups according to the educational status of the participants and a method used to cope with depression, anxiety, and stress.	Personal information form and DASS-21 scale

Table 3 Details of included studies V - VIII

	Authors, year, country	Name of the study	What was studied?	How study was conducted?	Outcome of the study	Metric
V	Savardelavar & Kuan, 2017, Malaysia	The impact of NLP on the reduction of competitive anxiety among athletes after a rehabilitation program	How does NLP affect the reduction of competitive anxiety in athletes?	Target group: 2 male basketball players, aged 16-17, who were recovering from injury. No control group. Using the NLP model, anchoring collapse, establishing resourceful states, and meta-model language patterns were employed to assist both athletes in reorganizing their dysfunctional thoughts and memories.	The results demonstrated that the NLP intervention successfully assisted athletes in addressing detrimental thoughts and anxiety related to their emotions. The NLP-based intervention to some extent aided athletes in managing their dysfunctional thoughts regarding previous injuries, resulting in a reduction in their competitive state anxiety and enabling their participation in future competitions.	Demographic questionnaire and CSAI-2
VI	Boughattas, Salha & Moella, 2022, Tunisia	The impact of NLP interventions on swimmers' psychosomatic skills, basic athletic skills, and performance.	How NLP interventions impact swimmers' psychosomatic skills, basic athletic skills, and performance?	12 adolescent voluntary swimmer from same swimming club were divided experimental group: 6, and control group: 6, which both consisted of 3 males and 3 females. The experimental group participated in the MTP over a period of 24 weeks, while the control group did not participate in any MTP activities.	The results demonstrated better anxiety management during competition for experimental group, as well as improvements in self-confidence and physical self-esteem. There was also a significant improvement in athletes' performance (from 0.77% to 2.5%).	The Arab State Competitive Anxiety Scale (EEACT), The Arabic Physical Self-esteem Scale: The Arabic version of the Physical Self Perception Profile, as well as qualitative, semi-structured interviews based on meta-model questions, were also conducted
VII	Kotera & Sheffield, 2019, Japan	The Impact of NLP Training on Mental Health	How does NLP training affect the health of Japanese workers?	Target group was 30 Japanese residents in Japan (15 males and 15 females), aged 18 or older, all employed, and all attending NLP Practitioner certification training. No control group.	The mean scores of depression and stress significantly decreased, and mental well-being significantly increased between pre-training and post-training, as well as between pre-training and follow-up. There was no significant difference between post-training and follow-up for any of the measures.	DASS-21 scale and WEMWBS scale
VIII	Shivani & Sridhar, 2019, India	The Efficacy of NLP Interventions on Social Anxiety in Young Adults.	How do NLP interventions affect socially anxious young adults?	30 young socially anxious literate people ranging from 18 to 30 years, allocated into the experimental and control group. The NLP interventions were conducted on the experimental group and the wait list control group underwent a similar kind of intervention provided by another NLP expert.	The results showed a reduction in social anxiety from pre-test (Mean = 118.27) to post-test (Mean = 48.8) in the intervention group. There was a slight increase in social anxiety for the control group which can be attributed to the elapsed time.	LSAS scale

5.2 Comparison of the studies I-VIII

There are several commonalities across the studies. Each study employed a pre-test post-test design, enabling evaluation of changes after interventions and laying a foundation for result comparison. Another similarity is the use of a standardized assessment tool for measuring anxiety, though the tools varied. Most of the studies (II, III, IV, VI, and VIII) had a control group, allowing for an assessment of the effects of the NLP approach in comparison to other factors. Additionally, it should be noted that many of the studies (II, III, V, VI, and VIII) focused particularly on adolescents and young adults, providing an opportunity to understand how different interventions affect this demographic. All studies noted significant changes in levels of anxiety, depression, or stress after NLP training or intervention. However, the studies focused on short-term effects, raising questions about long-term efficacy.

On the other hand, the differences between the studies are also evident. Approaches ranged from qualitative to quantitative, as well as experimental and single-subject research designs, adding a diversity that might limit direct comparisons. The studies also addressed anxiety in different settings and varied contexts. Moreover, sample sizes and durations varied significantly. Cultural and social differences arising from the geographical locations of the studies might also impact findings and interpretations. It is also noteworthy that different NLP interventions were used in the studies. In two studies (III and VII), participants were taught NLP, while study I did not specify which intervention was used. The variability in NLP interventions complicates the comparative evaluation of studies. However, this diversity allows for individual assessments of the interventions' effects in different contexts, offering a deeper understanding.

The quality of reporting varied across the studies, especially regarding participant details, inclusion and exclusion criteria, references, disclosure of ethical guidelines, and the researchers' NLP expertise. Studies VII and VIII were the only ones to mention the NLP qualifications of the researchers, and studies II and VI did not report ethical considerations, despite involving minor participants.

Studies I-VIII identified several consistencies and variances regarding the impacts of NLP interventions. While all studies showcased the effects of NLP on anxiety, depression, or stress, the primary focus was on short-term outcomes, leaving long-term effects largely unexplored. The methodologies, contexts, and samples across the studies varied, potentially limiting direct comparisons. Cultural and social differences, as well as the diversity in NLP interventions applied, also influence result interpretation. In summary, although NLP appears promising in managing anxiety, depression, and stress, further research is needed to understand its long-term effects and applicability across different contexts.

5.3 NLP interventions used in studies

In this section, the NLP interventions used in the selected studies for the literature review are presented and evaluated.

The NLP interventions used in Studies II-VIII varied significantly. In the studies, several different NLP interventions were used, which are presented in Table 4 - Table 10. Additionally, studies III and VII involved NLP training, and in the study VI, goal setting and visualization exercises were conducted, and communication skills were improved. The interventions used were not specified in the study.

De Rijk et.al. (2019) explored the challenges of evidencing the efficacy of NLP in scientific contexts. They undertook a Delphi survey to gain consensus among NLP professionals about NLP's core components, which clarified its key areas and universally accepted interventions. The survey results indicated the use of specific NLP techniques in addressing clinical issues like PTSD and depression. Notably, while the study has a potential bias due to its NLP-professional participants and authors, it offers transparency by revealing the derived data. They acknowledge that many NLP tools and techniques mirror those in other therapeutic approaches, attributing this to NLP's origin in modeling other therapies (de Rijk et al., 2019). Using the scale presented in the article, I introduce the NLP interventions used in the studies in order from the most validated (0 score) to the less validated (1,58 score). The presented strengths and weaknesses grounded in my experiential insights.

The NLP interventions that were used in studies I-VIII and scored the best on the Delphi survey were metamodel (Table 4) which was used with athletes in studies V and VI.

Table 4 Meta model

	Meta Model
Definition	A model that identifies patterns of language use that change the meaning of experience in communication through distortion, deletion, and generalization. A question model that clarifies imprecise language and brings a person closer to the original experience.
Delphi SD Score	0
Strengths	Questions bring a person closer to the original experience, which enables thinking to expand and beliefs to change. Helps reduce misunderstandings in interactions by clarifying vague or incomplete messages.
Weaknesses	Questions can arouse resistance if there is no rapport. Using a Meta model requires situational awareness or a clear mutual understanding of its use. It can lead to excessive analysis and hyper focusing on certain words in everyday life by practitioners.
Used in	V, VI

Another intervention that scored 0 is submodalities (Table 5), which was guided remotely during the Covid -19 pandemic, in study IV.

Table 5 Submodalities

	Submodalities
Definition	The characteristics of internal representations that create the meaning of experience. When submodalities change, the experience changes.
Delphi SD Score	0
Strengths	A flexible and effective method that can be applied individually, taking into account different representational systems
Weaknesses	Can evoke negative feelings, reactions, and fears if the approach is not adequately explained. The effectiveness of the intervention can vary depending on the instructor and the supervised.
Used in	IV

Also, the effectiveness of the intervention can vary depending on the instructor and the instructed. The subsequent validated interventions, all with a score of 0.26, were anchoring (Table 6) (used in studies V and VIII), collapsing anchor (Table 7), (used in study V), and the SWISH pattern (Table 8), (used in study VIII).

Table 6 Anchoring

	Anchoring
Definition	Anchor-Some stimulus that induces a reaction or emotional state. Anchoring: The process in which conditioning is utilized and things are associated with each other. An anchor can be naturally formed whereas anchoring is consciously created.
Delphi SD Score	0,26
Strengths	Enables the identification, adoption, and utilization of one's own resources related to past experiences, present situations, and future scenarios. Facilitates coping in challenging situations and helps move forward from difficult experiences.
Weaknesses	When it comes to a negative experience, a negative anchor may have been formed from a previous experience or trauma. Stimuli related to the earlier experience can trigger the anchor, causing an unpleasant feeling or even reactivating the person's traumatic experience. A built anchor can also be weak or lose its effectiveness if the associated emotional state is not strong enough or if the anchor has not been repeated sufficiently. Additionally, in a different frame of reference than NLP, anchors can be used as a tool for manipulation.
Used in	VI, VIII

Table 7 Collapsing anchor

	Collapsing anchor
Definition	A process in which an earlier, negative emotional experience or reaction is changed in such a way that an even stronger positive emotional experience is combined with the negative emotional experience, e.g. by means of touch.
Delphi SD Score	0,26
Strengths	Enables changing "over-the-top", excessive reactions and emotions caused by negative triggers and finding new perspectives.
Weaknesses	It also works in the other direction and can dilute positive feelings and reactions in an undesired way. The simultaneous nature of the 2 emotional states can be confusing and it may arouse negative feelings and resistance.
Used in	V

Table 8 SWISH

	SWISH
Definition	Submodality exercise in which unwanted habits or reactions can be changed by replacing unwanted mental images with desired ones, resulting in a transformed experience. By modifying the submodalities of the mental images and testing the outcome, negative reactions can be replaced with more positive responses in future situations.
Delphi SD Score	0,26
Strengths	Enables rapid change out of unwanted habits or reactions.
Weaknesses	Some individuals may perceive the technique as challenging or unpleasant, which can impact the effectiveness of the intervention. It is also crucial that the facilitator is competent to prevent chaining negative and positive experiences together.
Used in	VIII

Other interventions used in the studies were Perceptual positions (0,46) (Table 9) which was used in study V and the Disney strategy (0,6) (Table 10), used in study II.

Table 9 Perceptual positions

	Perceptual Positions
Definition	Refer to different perspectives that a person can use in interaction or when examining their own experiences. The point of view can be their own (1st position), someone else's (2nd position), or that of an objective observer (3rd position).
Delphi SD Score	0,43
Strengths	Helps broaden thinking, promote interaction and problem-solving, increase self-awareness, and facilitate the recognition of personal boundaries.
Weaknesses	It may feel difficult and even overwhelming for the participant if the explored interactional situation is challenging and evokes strong emotions. The participant may find it challenging to empathize with all perspectives and may refuse to do so. The increase in self-awareness can also bring about negative experiences, such as fatigue, as the individual begins to delve into themselves and their own perspective, which may be unfamiliar territory.
Used in	V

Table 10 Disney strategy

	Disney strategy
Definition	Perspective exercise in which the participant empathizes with three different roles, exploring their desired topic. The perspectives are the dreamer, the realist, and the critic.
Delphi SD Score	0,60
Strengths	Expands one's own thinking and offers versatile and useful perspectives in relation to the subject under investigation.
Weaknesses	For some individuals, taking on different perspectives can be challenging and may require a significant amount of time to guide the intervention effectively. If all the roles do not resonate with the participant, it can dilute the effectiveness of the intervention. Additionally, there is a risk of roles getting mixed up if the facilitator is not careful, which can weaken the overall outcome.
Used in	II

5.4 Results of the studies

In all the studies (I-VIII), anxiety levels decreased during the intervention. However, in study VII, a slight increase in levels of depression, anxiety, and stress was observed after a 3-month follow-up. It is noteworthy that in studies II and III, the control groups' anxiety levels also decreased. In study II, where the control group received traditional mathematics instruction, this might explain the reduction in anxiety. On the other hand, in study III, where the control group did not undergo any specific interventions, the slight drop in anxiety raises questions. This is especially notable given that the study took place during the academic year 2019-2020 when COVID-19 was reported and was declared a pandemic in the spring of 2020.

Interestingly, in studies IV and VIII, the control groups' anxiety levels increased during the study. Particularly in study IV, which was conducted during the Covid-19 pandemic and where the control group did not receive any specific intervention, this may partly explain the rise in anxiety. In

contrast, in study VIII, even though the control group was guided through a "comparable" NLP intervention by a professional, anxiety increased. The study's vague description of the control group's intervention leads to the assumption that not all NLP interventions might be effective in managing anxiety.

In study III, both experimental groups, the NLP group 1, and the CBT group 2, showed significant alleviation in depression, anxiety, and stress compared to the control group. Even though the levels decreased in both intervention groups, the results from the NLP group were slightly better. Study III researchers claimed that according to their results, NLP interventions were more effective in reducing stress than CBT. The study involved 18 sessions of NLP, lasting 45 minutes each, for a total of 13.5 hours. Conversely CBT consisted of only 6 sessions, lasting 60 minutes each, for a total of 6 hours. NLP was taught for almost double the amount of time as CBT, and this may explain the observed difference.

Lastly, in study V, self-confidence fluctuated for both athletes, initially rising significantly and then slightly decreasing. Similarly, anxiety levels for both individuals initially dropped considerably and then stabilized, decreasing slightly thereafter. Whereas in the study VI, it was observed that the athletes' self-confidence increased in direct proportion to the reduction of cognitive and somatic anxiety. This underscores the potential positive impact of NLP interventions on athletes' mental well-being.

5.5 Critical review of study VIII

(Shivani & Sridhar, 2019) published a research article in Jetir in 2019 in which they examined the effects of NLP interventions on the social anxiety of 30 young adults. The researchers chose this topic for investigation because existing literature has shown that NLP techniques for treating social anxiety have not been extensively studied in the Indian context, especially among young adults. Most studies have focused on other interventions, making this research topic both relevant and necessary in this area. I chose this study because I am interested in social anxiety, how it forms in our minds, and how it can be alleviated with the help of NLP. In my critical analysis, I refer to epistemological, ontological, and ethical factors.

The researchers' definition of NLP is highly versatile, offering multiple perspectives on what kind of approach NLP is, its focus, objectives, and its impact on individuals. Overall, the definition was comprehensive, and if I were to add to it, I would mention that NLP can enhance one's connection with oneself and others and improve interpersonal skills. The only thing I question in the definition is the claim that NLP yields rapid and long-lasting results by improving the understanding and awareness of cognitive and behavioral patterns. I agree that often changes are rapid and even permanent, and based on my experience, I have also observed that sometimes no change might

occur, or the change is not permanent. I believe it is crucial to highlight this perspective to avoid misleading the reader.

In this study, social anxiety is comprehensively defined, referencing physiological, mental, and behavioral factors. This definition highlights the primary causes of social anxiety, its effects on daily life, and the inner conflict it induces in an individual. While the definition provides deep insights into the experience of social anxiety, it lacks citations from research evidence or expert bodies, undermining its credibility. Cheng and Yang's (2022) study offers additional insights by examining social anxiety from various developmental perspectives. They suggest multiple influencing factors, including genetics, temperament, observational learning, and brain activation levels. They also emphasize the role of traumatic experiences on early brain development as a precursor to social anxiety. According to Hezel & McNally (2014), individuals with social anxiety have a reduced capacity to comprehend others' mental states social anxiety., yet they interpret the thoughts and emotions of others more intensely than those without.

30 participants were purposefully selected and randomly divided into experimental and control groups. The experimental group underwent anchoring and SWISH techniques, while the control group received a similar intervention from another NLP expert. Both groups were tested before and after the intervention using the Liebowitz Social Anxiety Scale (LSAS), and the results were compared. In experimental research, the effect of one variable on another is measured, focusing on careful sampling, systematic analysis, and control of variables; hypotheses are often tested (Hirsjärvi, et al., 2009). In qualitative research, data is collected from participants' environments using purposeful sampling, where participants are selected based on their experiences (Creswell, 2009, p. 177). The focus is on understanding the meanings related to social and human issues. In my opinion, the research method is well-suited for the chosen study, where the sample is selected based on participants' experiences and data is collected from their own environments. The study tests the hypotheses of the researchers and examines the impact of the NLP intervention on social anxiety, utilizing a control group for comparison. The researchers present their results in a numerical format, both in a table and as a bar chart, which provides a clear view of the study's findings.

The Liebowitz Social Anxiety Scale (LSAS) is used to assess the severity of symptoms of social anxiety disorder and to monitor symptom changes during treatment (Rytwinski, et al., 2009). It is a commonly used, reliable, and validated instrument whose strengths include accuracy and cost-effectiveness. A limitation of the LSAS test is that it may not account for attentional biases in online tests, unlike the two other anxiety-measuring instruments (Miloff, et al., 2015). Social anxiety is a personal experience, and in my opinion, the chosen scale is well-suited to measure it.

The study employed the SWISH technique (Table 8), with the first 11 participants of the experimental group. For the remaining 4 participants, an anchoring intervention (Table 6) was also applied. The SWISH technique, a submodality exercise, is effective in modifying unwanted habits and patterns, such as responses in social situations. Initially, one identifies the automatic reaction to unwanted behavior, like avoidance or nervousness. The mental image that triggers this behavior is then recognized and compared to a desired change image. During the process, the size and position of these images are altered, which is repeated several times, resulting in a change in experience. The efficacy of the intervention is tested by mentally revisiting triggering situations and observing reactions. The ultimate test occurs in real-life situations.

An anchor is a connection between a stimulus and a state or emotion. Anchors can also be deliberately created, a process known as "anchoring" (O'Connor & McDermott, 1998, p. 181). Anchoring describes the process where an internal response is linked to an external or internal trigger. For instance, a specific image or memory, hearing a certain song, or smelling the scent of a grandparent's home can act as anchors for a particular emotional state. Anchors can be consciously formed using past experiences and memories and utilized to strengthen a client's mental resources and well-being (Chamberlaine & Prince, 1996, p. 52).

In my opinion, the chosen interventions are well-suited for treating social anxiety. The SWISH pattern (Table 8) can identify and modify factors triggering social anxiety, thus alleviating it. However, it is essential to remember that multiple triggers can exist or develop over time, leading to a return of anxiety. In my view, anchoring (Table 6) is one of the most valuable NLP interventions as it can activate and harness necessary internal resources. I have observed that integrating these resources, for example, into a professional role, has been effective, with the required resources easily activated. In civilian life, where contexts and roles vary, constructed anchors have not always endured, and I have reverted to previous behavior patterns. I believe conclusions about the effectiveness of NLP cannot be drawn based on a single session. It would be crucial to conduct more extended studies and monitor participants to map long-term effects.

In the research article, it was mentioned that participants joined the study on a voluntary basis. However, it remained unclear whether the participants provided written consent to partake in the research. Furthermore, it is crucial to determine if the participants were fully informed about the potential risks, benefits, and other treatment options related to social anxiety provided by NLP interventions. Another ethical concern is that the article specified participants had sought services from the Quantum Wellness center due to social anxiety. Given that the center was explicitly named, it raises the question of whether researchers had the proper permission to disclose this information.

The study's findings demonstrated that social anxiety decreased significantly during a single NLP session that included anchoring and the SWISH pattern, proving particularly effective in alleviating social anxiety among young adults. However, it is essential to note that the temporal limitation of the study and the singular intervention might undermine this discovery. In other words, one might question whether the results are enduring in the long term or possibly a manifestation of a short-term "placebo effect". Based on my personal experience, I have experienced that a single NLP intervention often has an immediate impact, providing a feeling of relief. On the other hand, I have also noticed that the effects of interventions may not always last indefinitely. In my view, it would be crucial to identify the deeper cause of the symptoms, which would make the treatment's impact more lasting.

Researchers contend that NLP interventions yield quicker results compared to other psychotherapeutic and cognitive behavioral techniques. They argue that NLP emphasizes individual physiology, while traditional psychotherapeutic techniques tend to focus more on behavior. The researchers provided no references to previous studies to substantiate their claim. It remains unclear to me what they mean by emphasizing physiology. The assertion also lacks clarity on what "faster results" entail, and whether it refers to short-term or long-term outcomes. The researchers did not comment on the long-term effects of NLP interventions, which I believe is pivotal in alleviating symptoms of social anxiety.

I concur with the researchers that NLP interventions can serve as a standalone treatment for social anxiety and are cost-effective. In their findings, researchers also assert that NLP interventions have been observed to enhance an individual's mental health, self-awareness, and overall well-being, as well as reduce levels of anxiety and depression. This statement does not reference prior research, leaving it ambiguous as to the basis for their assertion.

The study exhibited several strengths. Firstly, the selection of participants was grounded in a rigorously defined "purposive sampling" method. Secondly, both experimental and control groups were chosen at random, bolstering the objectivity of the research. This randomization not only facilitated a robust comparison of results but also underscored the study's reliability. Notably, in evaluating the intervention, a comparison group was employed which underwent a similar NLP intervention delivered by a different expert. This expert comparison adds an additional layer of insight into the efficacy of NLP techniques. The study also utilized the LSAS, an objective measure, for evaluating social anxiety, thereby reinforcing the validity of the research. Another significant strength was the incorporation of precise and objective statistical methods, including the Mann-Whitney U-test and the Wilcoxon Signed Rank test. These methodologies unveiled statistically significant results, indicating a notable reduction in social anxiety following the NLP intervention. The study's strengths lie in the clear definition of its hypotheses and their testing using the stated

statistical methods. Another notable point is the clear and detailed presentation of results for both the intervention and control groups. This clarity helps in understanding and comparing the findings. The study also provided a thorough look at social anxiety levels both before and after the NLP intervention.

However, the study has its limitations. The small sample size of only 30 participants makes it difficult to apply the findings more broadly, and it raises questions about how trustworthy the results are. The study's duration was short, so we do not know about the long-term effects of the NLP intervention. Also, the findings were not compared to other treatments, like cognitive behavioral therapy. There were other concerns too. The control group received a similar NLP intervention from another expert, but their anxiety levels went up a bit. This suggests that not all NLP interventions work equally well. For others to repeat the study, it would have been helpful to know more about what the control group experienced. A big concern is the limited number of references. The study cited only five other studies in its literature review and made other claims without backing them up with prior research. Including more and relevant references would have made the study's findings more convincing.

CBT, pharmacotherapy, and their combination are widely accepted and extensively utilized treatments for anxiety and social anxiety (Munir & Takov, 2022). While CBT provides strategies to diminish anxiety and foster social skills, ACT addresses anxiety management through mindfulness techniques and goal setting, though there exists limited empirical evidence supporting its efficacy (NationalInstituteofMentalHealth, 2022). The efficacy of NLP has also been explored to a limited extent, yet a meta-analysis suggests it holds comparable efficacy to other psychotherapeutic approaches (Zaharia et al., 2015). Knekt et al. (2011) conducted a study comparing short and long-term psychotherapy with psychoanalysis. Their findings indicated that short-term therapies initially exhibit greater efficacy, but psychoanalysis proves most effective in the long run. Further research is imperative to conclusively ascertain the relative efficacy of these methodologies. One might argue that NLP, being solution-focused, aims for the same objectives as CBT and ACT. However, conclusive data regarding its long-term impact remains scarce. Nonetheless, I am inclined to believe that NLP stands on equal footing and is at least as potent in treating anxiety as other short-term therapeutic orientations.

Looking to the future, the utilization of the social panorama model in the treatment of social anxiety could offer an interesting perspective. The Social Panorama model is a social psychological tool applied in the NLP framework. It is used to explore and modify the structures of social experience, subconscious social patterns, and ways of thinking. The use of this model enhances social relationships and interactive situations by altering the subconscious map of relational reality to

better serve the individual and groups (Derks, 2005; Dr Derks n.a.). This could be one potential research path in the future when investigating social anxiety.

In summary, this study presents significant findings regarding the role of NLP in the treatment of social anxiety, distinguishing itself from traditional treatment methods such as CBT and pharmacotherapy. Although the results of the study are encouraging, its methodological constraints – such as limited references to other research literature and ethical ambiguities, including ensuring participant consent and open communication about potential risks – undermine the study's credibility. While the study emphasizes that NLP provides faster results compared to traditional methods, its time constraints and single intervention design raise doubts about the long-term stability of the results. The limited sample size also underscores concerns about the broader generalizability of the findings. Against this backdrop, it's important to highlight that while CBT and pharmacotherapy remain at the forefront of anxiety treatments, NLP appears to offer efficacy comparable to these treatment methods. However, psychoanalysis seems to yield superior results in the long run. Further research is essential to gain a deeper understanding of the long-term effects of NLP compared to these established treatment methods.

6. Conclusions

Based on the literature, NLP interventions have shown effectiveness in addressing anxiety, yet knowledge regarding their long-term impacts remains inconclusive. Limitations of the studies, including small sample sizes and design deficiencies, compromise the robustness of the findings. There's a possibility that only studies confirming NLP's effectiveness have been published recently, highlighting concerns of publication bias. Even though CBT and pharmacotherapy remain cornerstones in anxiety treatment, preliminary evidence suggests that NLP offers a promising alternative, comparable to established psychotherapeutic techniques. This review, comprising only 8 studies, has its inherent limitations in reliability and generalizability. Further research, supported by standardized guidelines, is essential.

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