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## UNDERLYING PROCESSES IN THE NORWEGIAN UNIVERSAL PREVENTIVE PROGRAM FOR SOCIAL ANXIETY

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### Abstract

Few prevention investigations undergo testing of mechanistic hypotheses. To date, no published study has reported the processes underlying the effectiveness of a prevention program aimed at reducing social anxiety in a population-based sample of preadolescents.

A parallel multiple mediator model was used to examine the mediation of outcomes from the Norwegian Universal Prevention Program for Social Anxiety (NUPP-SA) by five intermediary variables that well approximate established DSM-5 social anxiety disorder diagnostic criteria.

The NUPP-SA works differently for preadolescents with subsyndromal versus syndromal social anxiety. Among the former, the NUPP-SA intervention works via public performance, avoidance, physical/cognitive, and assertiveness factors. For the latter, the NUPP-SA works via the public performance factor. The intervention did not work for either group via the social encounter factor.

Universal prevention programs are essential for reducing the impacts of chronic disorders at the individual, institutional, and societal levels. Introducing a universal prevention program in school settings requires validation, including these results demonstrating that the NUPP-SA affects both those with syndromal and subsyndromal social anxiety symptoms via public performance. These results support the notion that many children with subsyndromal social anxiety disorder can be impacted with adequate intervention, which is both feasible and, given the widespread problem with public speaking, suggests a target for universal implementation.

**Keywords:** mediation, prevention, intervention, social anxiety, adolescents.

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Social Anxiety Disorder (SAD) is among the most common, widespread, and incapacitating psychiatric disorders, also among children and adolescents (Aune et al., 2022; Burstein et al., 2013; Stein & Stein, 2008).

SAD is often called “the neglected disorder” (Nagata et al., 2015, p. 724). Individuals with SAD are not diagnosed until an average of 7 years after symptom onset, and only 10–20% of those with SAD seek treatment (Aune & Stiles, 2009). Despite some promising treatment results among older children and young adolescents (Beidel et al. 2007; 2021), the effectiveness of even proper treatment is reported as low (Cartwright-Hatton, 2004; Yang et al., 2019).

In a meta-analysis, Scaini et al. (2019) demonstrated larger effect sizes in treatment outcome studies that included social skills training sessions. Another meta-analysis by Yang et al. (2019) compared SAD interventions in children and adolescents, demonstrating that psychological interventions comprised of Cognitive Behavior Therapy (CBT) and Behavior Therapy (BT) were significantly more effective than control conditions. However, there was an average 21.8% dropout rate in the intervention groups, with higher dropout rates in CBT compared with BT interventions. Further, high heterogeneity in primary outcome measures suggests possible systematic differences among included studies. Furthermore, the waitlist conditions were inferior to other control conditions like psychological placebo (Ingul et al., 2014) and no treatment (Herbert et al., 2009). Ten out of 17 randomized controlled trials (RCTs) included a waitlist as the only control condition for comparison, which may have also impacted findings. Finally, Yang et al. (2019) concluded that the risk of bias was moderate to high in most of the studies included, indicating that their results should be considered cautiously. Moreover, Beidel et al. (2021) showed that 63% of children treated with the Social Effectiveness Therapy for Children (SET-C) and 60% of those treated with Pegasys-VR™ no longer met SAD diagnostic criteria posttreatment; however, neither group reached the clinically recommended cutoff score of  $\leq 17$  on the Social Phobia and Anxiety Inventory for Children (SPAI-C), indicating that participants in both treatment conditions continued to report multiple SAD symptoms posttreatment.

The cumulative evidence shows a high prevalence of SAD among adolescents (Aune et al., 2022; Burstein et al., 2013). Kessler et al. (2005) described SAD as a primary diagnosis that emerges in early development, often leading to later depression and substance abuse. In addition, few young people with SAD receive treatment, and the reported treatment effectiveness is reported to be low.

This was the impetus for developing the Norwegian Universal Prevention Program for Social Anxiety (NUPP-SA). The NUPP-SA uses a cognitive behavioral format. The program targets all grades 6–9 students, parents/guardians, teachers, school staff, and county health and welfare workers. The NUPP-SA is efficacious in a cluster RCT (Aune & Stiles, 2009) with the SPAI-C as the primary outcome measure and the SCARED (Screen for Child Anxiety Related Emotional Disorders) as a secondary outcome measure.

Further, Aune and Stiles (2009), Ingul et al. (2014), Beidel et al., (2021), and most studies included in the meta-analyses by Yang et al. (2018) and Scaini et al. (2016) used the SPAI-C as the primary outcome measure, allowing comparison of results across studies. Previous studies examining the factor structure of the SPAI-C have suggested a five-factor (Aune et al., 2008; Fitzgerald et al., 2019; Ogliari et al., 2012; Storch et al., 2004) model. Fitzgerald et al. (2019) examined a relatively large sample of adolescents in Ireland, applying confirmatory factor analysis and DSM-5 (APA, 2013) criteria to support the five-factor structure proposed by Aune et al. (2008) including *assertiveness*, *physical/cognitive*, *public performance*, *social encounter*, and *avoidance* factors or subscales. The five-factor structure provides a good approximation to the established DSM-IV (APA, 1994) and the DSM-5 (APA, 2013) criteria, and is easily interpretable and theoretically justified.

A key intervention study objective is understanding the psychological processes by which predictor variables affect outcomes. Mediation analysis has been used to examine relations among predictor and outcome variables in studies examining the intermediate effects of, for example, behavior inhibition (Buzzell, 2017), social support, and social self-efficacy (Aune et al., 2021) among individuals suffering from SAD. However, SAD intervention studies with older children and young adolescents rarely report intermediate effects.

## **The present study**

Using a cluster RCT, Aune and Stiles (2009) demonstrated that the NUPP-SA shows both prevention and treatment effects. Assessing the intervention among both participants with SPAI-C pretest scores  $\geq 18$  (i.e., syndromal) ( $n = 190$ ) and the overall sample ( $N = 1,439$ ) revealed effect sizes of .88 and .21, respectively. However, to date, no study has tested hypotheses regarding the mechanism by which the NUPP-SA process works.

Although the SPAI-C has been used in many RCTs across various interventions (Yang et al., 2019), to our knowledge, no study has reported the specific effects of interventions on specific SAD characteristics. Furthermore, examining how social anxiety prevention interventions work for the total sample and those with syndromal social anxiety will help disassemble interventions, allowing them to become more targeted.

To address this need, we used data from the RCT by Aune and Stiles (2009) to examine the underlying mechanisms of the NUPP-SA in a large population-based sample of older children and young adolescents. The five SPAI-C factors identified by Aune et al. (2008) and Fitzgerald et al. (2019), and which resembled the diagnostic criteria described both in DSM-IV (APA, 1994) and DSM-5 (APA, 2013) were the intermediate variables, and the SCARED social anxiety subscale was the

outcome variable. The SPAI-C and SCARED inventories were assessed at both assessment points.

This study aims to examine which specific factors of the SPAI-C the NUPP-SA intervention effect contains.

For this explorative study, we hypothesized that the NUPP-SA, based on CBT, will have significantly similar indirect effects (IE) across the five factors in both the syndromal and the total sample.

## **Method**

### *Participants and procedure*

Older children and young adolescents in grades 6–9 who were 11–14 years old ( $M = 12.6$ ,  $SD = 1.1$ , range 11–14) and living in two municipalities in the central region of Norway participated in the study. A total sample of 1,748 (856 boys, 892 girls) returned a consent form signed by them and one parent/guardian. A total sample of 1,633 students participated in assessments I and II, 12 months apart. Guidelines for obtaining a valid SPAI-C score (Beidel et al., 1998) were followed strictly, resulting in a final sample of 1,439 participants (692 boys, 747 girls) with valid scores at both assessment points.

The two municipalities from the Nord-Trøndelag province, chosen to participate in the study were randomly assigned to the intervention or nonintervention control conditions. This design was used to avoid the cross-contamination that may occur when an intervention is applied to students at different schools within the same county. A detailed description of the participants, procedures, components, adherence, competence, and integrity of the NUPP-SA, along with a chronological overview of the intervention, was published previously (Aune & Stiles, 2009). Table 1 describes the overall sample demographics.

### *Measures*

#### *Social Phobia and Anxiety Inventory for Children (SPAI-C)*

The SPAI-C is a widely used self-report inventory that evaluates the somatic, cognitive, and behavioral aspects of social anxiety and SAD according to the DSM-IV (APA, 1994) criteria (Aune et al., 2008, 2022; Fitzgerald et al., 2019; Storch et al., 2004) and DSM-5 (APA, 2013) criteria (Aune et al., 2022) among older children and young adolescents. The SPAI-C assesses the severity of a range of social fears using 26 items rated on a 3-point Likert scale. Its psychometric properties are moderate to excellent according to various studies across cultures and continents (Scaini et al., 2012). It has high-to-excellent reliability and moderate-to-high validity (Beidel et al., 1995) and differentiates children and adolescents with SAD from normal controls (Beidel et al., 1995), externalizing disorders (Beidel, 1996), and

other anxiety disorders (Beidel et al., 2000). These findings have been held for different Norwegian population-based samples (Aune et al., 2008; Hjemdal et al., 2007) and various clinical samples (Ingul et al., 2014). Previous studies examining the factor structure of the SPAI-C have suggested a five-factor (Aune et al., 2008; Fitzgerald et al., 2019; Ogliari et al., 2012; Storch et al., 2004) model. Fitzgerald et al. (2019) examined a relatively large sample of adolescents in Ireland, applying confirmatory factor analysis and DSM-V criteria to support the five-factor structure proposed by Aune et al. (2008) including *assertiveness*, *physical/cognitive*, *public performance*, *social encounter*, and *avoidance* factors or subscales.

The *assertiveness* subscale is related to question like (scared when becoming the center of attention), whereas the *physical/cognitive* subscale, the *public performance*, *social encounter*, and *avoidance* subscales are assessed by question like (when I'm with other people, I think "scary" thoughts) (scared when speaking in front of class) (scared when joining a large group) and (avoid social situations; parties, school, playing with others), respectively.

In their factor analysis with principal axis factoring and an oblique rotation, Aune et al. (2008) revealed a best fit for a five-factor solution, with Cronbach alphas of .82, .76, .80, .64, and .67 for *assertiveness*, *physical/cognitive*, *public performance*, *social encounter*, and *avoidance*, respectively. Internal consistency (Cronbach alpha) for the total SPAI-C was .92.

#### *Screen for Child Anxiety Related Emotional Disorders*

The SCARED is a 41-item self-report inventory developed as a sensitive and specific measure for assessing DSM-IV symptoms of panic, general anxiety, separation anxiety, social anxiety, and school refusal. Items are rated on a 3-point Likert scale. SCARED is appropriate for older children and adolescents aged 9–18 years and has demonstrated adequate psychometric properties in two large clinical samples (Birmaher et al., 1997, 1999), a community sample (Muris et al., 1998), and a project examining anxiety disorders at the National Institute of Mental Health (Behrens, Swetlitz, Pine & Pagliaccio, 2019). In a meta-analysis, Hale et al. (2011) reported adequate internal consistencies for both the total scale and each of the subscales, except for school refusal. This five-factor structure has been confirmed in both clinical and community samples (Ogliari et al., 2006; Wren et al., 2007). In their evaluation of the Norwegian version of the SCARED with 4,425 participants from seven Norwegian samples and four Danish and Swedish samples, Skarphedinsson and Villabø (2015) reported excellent internal consistency for the total scale and acceptable-to-good consistency for the subscales. Convergent validity showed that the SCARED social anxiety subscale was correlated ( $r = .63$ ) significantly more highly with the SPAI-C than the other SCARED subscales. Herein, a Cronbach's alpha coefficient of .93 was obtained for the total SCARED, and .80 for social anxiety subscale.

## **Norwegian Universal Prevention Program for Social Anxiety (NUPP-SA)**

The NUPP-SA uses a cognitive behavioral format. The program targets all students in grades 6–9, their parents/guardians, teachers, school staff, and county health and welfare workers. All public health nurses were given 1 day of lectures, followed by supervision, on psychoeducation and the principles of CBT for SAD treatment. Teachers, school personnel, community health and welfare workers, primary physicians, and parents/guardians received a 1–2-hour lecture. For teachers and school personnel, the management of social anxiety, both individually and in the classroom environment, was emphasized. The lecture for parents/guardians focused on social anxiety as a common phenomenon and explored the distinction between normal and pathological social anxiety. Parents were motivated to encourage their children to expose themselves to potentially threatening social situations and to engage in social contact with their children’s classmates, particularly those who appeared overly shy or insecure in social situations.

Altogether, the students received 3 hours of school interventions, beginning with a 45-minute lecture about anxiety, emphasizing normalcy and how anxious thoughts, affects, and associated somatic symptoms can be recognized to avoid their misinterpretation. Forty-five minutes were then spent completing a handout on skills to increase the student’s perceived ability to cope with situations that might provoke social anxiety. The aim was to teach coping strategies that counteract cognitive distortions and misattributions. The students were encouraged to verbalize and write down scary or threatening thoughts that either they or others may have had in various social and performance situations. They were also challenged to imagine and write down less threatening, more realistic thoughts. They were encouraged to identify thoughts that could help them engage in social situations, even when they were anxious or scared. During the final 45 minutes, the students were asked to write an essay based on one of three prompts, all of which focused on different aspects of coping with social anxiety.

At the end of the lectures for each target intervention group, a booklet with the project website was provided, containing psychoeducational information about social anxiety along with a description of CBT. Finally, a three-page psychoeducational overview with study information was printed in the local newspaper. A more detailed, chronological overview of the intervention was published previously (Aune & Stiles, 2009).

### *Statistical analyses*

Descriptive analyses were conducted using SPSS Statistics for Windows (v. 27.0; IBM SPSS, Armonk, NY, USA). Means and standard deviations for the outcome variable (SCARED social phobia subscale) and the five SPAI-C mediators (*assertiveness, physical/cognitive symptoms, public performance, social encounter,*

and *avoidance*) are presented for assessment points I and II. The correlations among the five mediators and outcome variable at assessment point I are also reported.

Before testing the study hypothesis, we considered Baron and Kenny's (1986) basic assumptions for conducting mediation. However, more recently published methodological studies (Hayes, 2018; MacKinnon & Luecken, 2008; Rucker et al., 2011) have demonstrated that IE can be estimated exclusive of the basic steps proposed by Baron and Kenny (1986).

Our goal was to test how the NUPP-SA intervention program and the variation between the intervention (0) and nonintervention (1) groups ( $X_{0,1}$ ) causes variation in the five mediating factors (i.e., *assertiveness*, *physical/cognitive symptoms*, *public performance*, *social encounter*, and *avoidance*), which in turn causes variation in the outcome variable.

To assess for mediation, Hayes' (2018) PROCESS macro for SPSS (v. 3.5; SPSS Inc, Chicago, IL, USA) was used. Hayes' PROCESS macro employs a regression-based path analysis approach. To test for the statistical significance and obtain the 95% bias-corrected confidence level for the IE, standard maximum likelihood bootstrapping was performed by estimating 5,000 bootstrap samples for the hypothesized model. Bootstrapping as a resampling method was recommended to estimate mediation (Hayes, 2018). If the 95% confidence interval (CI) does not include 0, it means a significant IE ( $p < .05$ ). All reported regression coefficients are unstandardized.

We used a parallel multiple mediator model to test the various mediators' specific IE, while simultaneously controlling for all the other mediators in the model. Cumulatively, the specific IE yield the total effect of  $X$  on  $Y$  through all mediators in the model. The direct effect of  $X$  quantifies how much two cases that differ by one unit on  $X$  are estimated to differ on  $Y$ , independent of all mediators (Hayes, 2018). A pairwise comparison was applied to test whether one IE differed significantly from the others.

### *Ethics*

The Regional Ethics Committee (REK.nr. 084-03) and the Privacy Ombudsman for Research, Norwegian Social Science Data Services approved the study. Written consent forms, to be signed by their parents or guardians, were distributed to the children during class. Those children who had yet to return the written consent form within a week were given a reminder.

## **Results**

Demographic characteristics and clinical status for the intervention and nonintervention groups were published previously (Aune & Stiles, 2009). Tables 1

and 2 show overviews of the main demographic and clinical characteristics of the two samples, respectively.

**Table 1.** Demographic Characteristics of the Intervention and Control Groups

Characteristic	Intervention group		Control group		$\chi^2$	P
	n	%	n	%		
<i>Gender</i>					0.89	.77
Girls	413	51.2	334	52.4		
Boys	388	48.8	304	47.6		
<i>Grade/age</i>					2.02	.57
6 <sup>th</sup> grade	191	23.9	120	18.9		
7 <sup>th</sup> grade	210	26.2	155	24.3		
8 <sup>th</sup> grade	190	23.7	202	31.7		
9 <sup>th</sup> grade	210	26.2	161	25.2		
<i>Parents/guardian, living with</i>					0.92	.99
Both parents	626	78.2	502	78.6		
Mother alone and/or with new partner	148	18.5	115	18.0		
Father alone and/or with new partner	21	2.6	14	2.2		
Other guardians	4	0.5	2	0.3		
Not reported	2	0.2	5	0.8		
<i>Siblings/stepsiblings, living with</i>					0.11	.75
No	85	10.6	71	11.1		
Yes	701	87.5	554	87.5		
Not reported	15	1.9	13	2.0		

**Table 2.** Means (M) and Standard Deviations (SD) of all Dependent Variables at Assessment One (I) and Two (II) by Group (Intervention/Control)

Dependent variable <sup>1</sup>	Intervention group (n = 801)				Control group (n = 638)			
	I		II		I		II	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
SPAI-C	9.44	7.76	7.02	6.96	9.22	6.60	8.28	7.51
SCARED								
Total difficulties	10.75	11.24	8.97	9.58	11.09	9.54	10.98	11.33
Social anxiety disorder	3.39	2.82	2.97	2.76	3.58	2.76	3.38	2.97
Panic and somatic disorder	2.31	3.58	1.72	2.91	2.24	2.93	2.21	3.58
General anxiety disorder	2.55	3.24	2.28	3.06	2.69	3.00	3.05	3.41
Separation anxiety disorder	1.76	2.49	1.34	2.11	1.88	2.37	1.62	2.48
School avoidance	0.73	1.23	0.67	1.17	0.72	1.24	0.71	1.27

<sup>1</sup>SPAI-C: Social Phobia and Anxiety Inventory for Children; SCARED: Screen for Child Anxiety Related Emotional Disorders.

The intervention and nonintervention groups did not differ in any demographic or clinical variables at pre-intervention. Tables 3 and 4 show the means and standard deviations of the SCARED social anxiety subscale and the five SPAI-



C factors at assessment points I and II for the total sample and for the syndromal SAD participants, respectively.

Table 5 shows the correlations among the five SPAI-C factors and SCARED social anxiety subscale for the subsyndromal sample at assessment point I.

**Table 3.** Descriptive Characteristics for Total Sample (N = 1,439) on Outcomes and Mediators at Assessment Points I and II by Intervention/Control Group

Assessment point	Intervention group (n = 801)				Control group (n = 638)			
	I		II		I		II	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Dependent variable								
SCARED social anxiety subscale (n = 1,428)	3.39	2.82	2.97	2.76	3.58	2.76	3.38	2.97
SPAI-C factors (N = 190)								
<i>Assertiveness</i>	2.42	1.93	1.75	1.75	2.49	1.79	2.11	1.94
<i>Physical/cognitive</i>	1.06	.97	.73	1.08	1.05	1.20	.89	1.17
<i>Public performance</i>	2.83	2.51	2.27	2.46	2.46	2.20	2.57	2.48
<i>Social encounter</i>	.48	.93	.34	.68	.48	.76	.40	.84
<i>Avoidance</i>	.84	1.20	.57	.95	.84	1.04	.74	1.09

**Table 4.** Descriptive Characteristics for the Syndromal Social Anxiety Group (N = 190) on Outcomes and Mediators at Assessment Points I and II by Intervention/Control Group

Assessment point	Intervention group (n = 112)				Control group (n = 78)			
	I		II		I		II	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Dependent variable								
SCARED social anxiety subscale (n = 186)	6.47	3.20	4.55	3.36	6.55	2.75	5.62	3.36
SPAI-C factors (N = 190)								
<i>Assertiveness</i>	5.33	1.66	3.16	2.19	5.01	1.43	3.80	2.19
<i>Physical/cognitive</i>	2.98	1.59	1.55	1.58	3.00	1.46	1.81	1.54
<i>Public performance</i>	6.89	2.20	4.12	2.98	6.19	1.76	4.97	2.92
<i>Social encounter</i>	1.88	1.54	.76	.96	1.56	1.14	1.09	1.36
<i>Avoidance</i>	2.79	1.56	1.23	1.38	2.55	1.15	1.65	1.44

**Table 5.** Descriptive Statistics and Correlation Coefficients for the SCARED Social Anxiety Subscales and SPAI-C Factors (N = 1,439) at Assessment Point I.

Variables	Mean	<i>SD</i>	1	2	3	4	5
1. SCARED social anxiety subscale (n = 1,428)	3.47	2.80					
2. <i>Assertiveness</i>	2.45	1.87	.525**				
3. <i>Physical/cognitive</i>	1.06	1.23	.490**	.557**			
4. <i>Public performance</i>	2.67	2.38	.539**	.611**	.548**		
5. <i>Social encounter</i>	.48	.86	.376**	.538**	.482**	.515**	
6. <i>Avoidance</i>	.84	1.13	.483**	.648**	.580**	.555**	.584**

\*\* $p < 0.01$  level (two-tailed).

As expected, there were significant correlations ( $p < .001$ ) between SCARED social anxiety subscales and the five SPAI-C factors, ranging from  $r = .376$  (*social encounter*) to  $r = .539$  (*public performance*). Correlations among the

five factors were moderate to high, ranging from  $r = .482$  (*social encounter* and *physical/cognitive*) to  $r = .648$  (*avoidance* and *assertiveness*), explaining 26% and 32.5% of the variance, respectively.

### *Total sample*

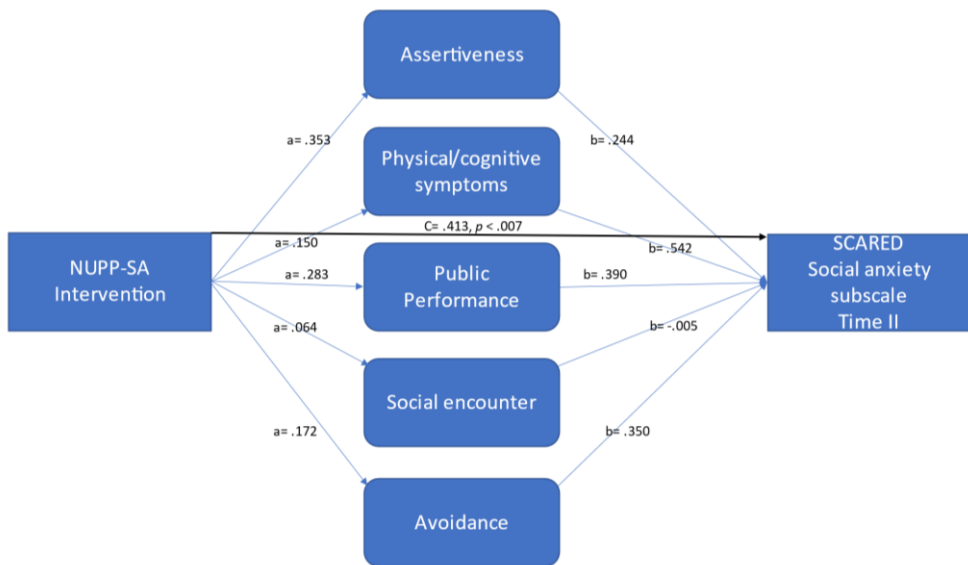
The mediation analysis used a bootstrapping method to examine whether and how the factors of assertiveness, physical/cognitive, public performance, avoidance, social encounter, and public performance mediated the relation between NUPP-SA and social anxiety symptoms. In other words, it asked: how does the NUPP-SA work?

First, at assessment point I, there was no significant difference between the intervention and the control group ( $b = .188, se = .150, t = 1.265, p = .206$ ). Second, there was a significant total effect of the intervention ( $b = .413, se = .153, t = 2.680, p = .007$ ), with a SCARED social anxiety subscale mean score difference of 0.41 (Table 3), or 12.1%, between the intervention and nonintervention groups at assessment point II. Third, controlling for the five mediating factors, a nonsignificant direct effect ( $C = .105, se = .119, t = .880, p = .380$ ) (Table 6) was found between the intervention and nonintervention groups at assessment point II, demonstrating a full mediation effect of the intervention (predictor variable) to social anxiety (outcome variable) via the five mediating factors. The mediators accounted for approximately 41% of the total effect on social anxiety symptoms. Fourth, Table 6 shows that the effect of the NUPP-SA is via four intermediary factors: *assertiveness*, *physical/cognitive*, *public performance*, and *avoidance*. However, the NUPP-SA does not work significantly via *social encounter* ( $F(1, 1409) = 2.650, p < .104$ ). Fifth, we examined the magnitude of each indirect mediator path to reveal significant IE for *assertiveness* (IE = .086, BootSE = .032; 95% CI = .030 – .156); *physical/cognitive* (IE = .052, BootSE = .025; 95% CI = .010 – .107); *public performance* (IE = .110, BootSE = .053; 95% CI = .010 – .219); and *avoidance* (IE = .060, BootSE = .028; 95% CI = .015 – .124). However, *social encounter* (IE = .000, BootSE = .013; 95% CI = -.032 – .024), showed that the bootstrap CI estimates crossed 0, which indicates a nonsignificant IE for this factor. Sixth, we examined pairwise comparisons between the IE to reveal that the IE for *social encounter* was significantly lower than the IE for *assertiveness* (IE = .086, BootSE = .039; 95% CI = .023 – .172), *physical/cognitive* (IE = .053, BootSE = .027; 95% CI = .008 – .115), *avoidance* (IE = -.060, BootSE = .032; 95% CI = -.136 – -.011), and *public performance* (IE = -.111, BootSE = .057; 95% CI = -.232 – -.008). The IE for all other pairwise comparisons were nonsignificant (Figure 1).

**Table 6.** Regression Coefficients, Standard Errors, and Model Summaries for the NUPP-SA Intervention Program. Parallel Multiple Mediator Model Depicted in Figure 1 (N = 1,411)

Antecedent	Outcome																							
	M1 ( <i>Assertiveness</i> )			M2 ( <i>Physical/Cognitive</i> )			M3 ( <i>Public performance</i> )			M4 ( <i>Social encounter</i> )			M5 ( <i>Avoidance</i> )			Y (SCARED SAD)								
	Coeff.	SE	P	Coeff.	SE	P	Coeff.	SE	P	Coeff.	SE	P	Coeff.	SE	P	Coeff.	SE	P						
X ( <i>County</i> )	a1	.353	.098	<.001	a2	.150	.059	.011	a3	.283	.133	.032	a4	.064	.039	.104	a5	.172	.053	.001	C'	.105	.119	.380
M1 ( <i>Assertiveness</i> )																					b1	.244	.119	<.001
M2 ( <i>Physical/cognitive</i> )																					b2	.542	.075	<.001
M3 ( <i>Public performance</i> )																					b3	.390	.032	<.001
M4 ( <i>Social encounter</i> )																					b4	-.005	.109	.965
M5 ( <i>Avoidance</i> )																					b5	.350	.090	<.001
Constant	iM1	1.750	.065	<.001	iM2	.740	.040	<.001	iM3	2.280	.088	<.001	iM4	.332	.026	<.001	iM5	.566	.036	<.001	iy	1.202	.101	<.001
	R <sup>2</sup> = .009			R <sup>2</sup> = .005			R <sup>2</sup> = .003			R <sup>2</sup> = .002			R <sup>2</sup> = .007			R <sup>2</sup> = .405								
	F(1, 1409) = 13.122		p < .001		F(1, 1409) = 6.371		p = .012		F(1, 1409) = 4.594		p = .032		F(1, 1409) = 2.650		p = .104		F(1, 1409) = 10.335		p = .001		F(6, 1404) = 159.151		p < .001	

C' = Direct effect from X to Y controlling for the model mediators.



**Figure 1.** The direct effect of the intervention, where the various slopes show the indirect effects across the five factors for the total sample.

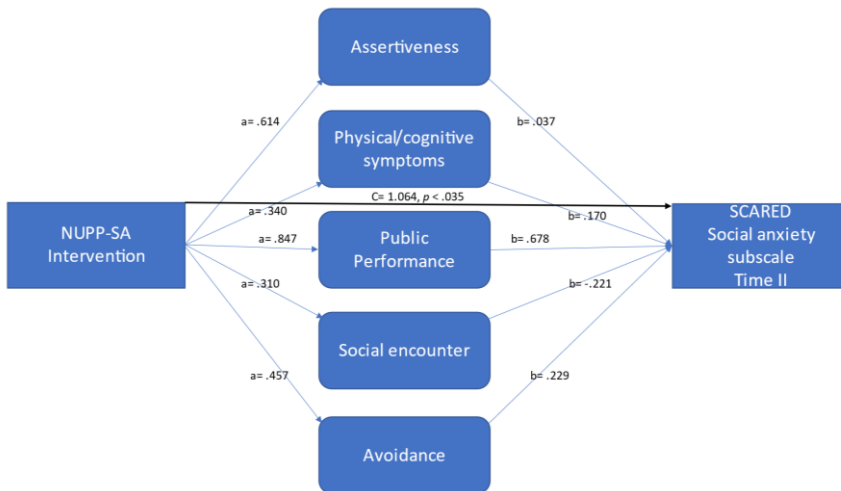
### Syndromal sample

At assessment point I, the intervention and nonintervention groups had a nonsignificant SCARED social anxiety subscale difference ( $b = .077$ ,  $se = .449$ ,  $t = .172$ ,  $p = .864$ ). There was a significant total effect of the intervention ( $b = 1.064$ ,  $se = .501$ ,  $t = 2.124$ ,  $p = .035$ ), demonstrating a SCARED social anxiety subscale mean score difference of 1.07 (see Table 4) or 23.5%, between the intervention and nonintervention groups at assessment point II. Controlling for the five mediating factors, a nonsignificant direct effect ( $C = .373$ ,  $se = .380$ ,  $t = .984$ ,  $p = .326$ ) was found between the intervention and nonintervention groups at assessment point II, demonstrating a complete mediation from the predictor variable (intervention versus control) to social anxiety (outcome variable) through the mediation factors. The mediators accounted for approximately 47% of the total effect on social anxiety symptoms. Table 7 shows that the NUPP-SA significantly acts through the intermediary factor *public performance* (IE = .074, BootSE = .300; 95% CI = .012 – 1.203). Inversely, the NUPP-SA does not work significantly via the *social encounter*, *avoidance*, *physical/cognitive*, or *assertiveness* factors. Pairwise comparisons among the five intermediary factors show that *public performance* was significantly stronger than *assertiveness* (IE = -.552, BootSE = .304; 95% CI = -1.223 – -.016) and *social encounter* (IE = -.643, BootSE = .340; 95% CI = -1.356 – -.028). For all other pairwise comparisons, there were nonsignificant IE between factors (Figure 2).

**Table 7.** Regression Coefficients, Standard Errors, and Model Summary Information for the Syndromal Social Anxiety Disorder Sample (N = 186) Examining the Effects of the NUPP-SA Intervention Program. Parallel Multiple Mediator Model Depicted in Figure 1

Antecedent	Outcome																												
	M1 ( <i>Assertiveness</i> )			M2 ( <i>Physical/Cognitive</i> )			M3 ( <i>Public performance</i> )			M4 ( <i>Social encounter</i> )			M5 ( <i>Avoidance</i> )			Y (SCARED SAD)													
	Coeff.	SE	P	Coeff.	SE	P	Coeff.	SE	P	Coeff.	SE	P	Coeff.	SE	P	Coeff.	SE	P											
X ( <i>County</i> )	a1	.614	.320	.057	a2	.340	.224	.131	a3	.847	.436	.054	a4	.309	.154	.046	a5	.457	.200	.024	C'	.373	.380	.326					
M1 ( <i>Assertiveness</i> )																					b1	.037	.134	.783					
M2 ( <i>Physical/cognitive</i> )																						b2	.170	.181	.940				
M3 ( <i>Public performance</i> )																							b3	.678	.093	<.001			
M4 ( <i>Social encounter</i> )																								b4	.221	.242	.362		
M5 ( <i>Avoidance</i> )																									b5	.229	.220	.300	
Constant	iM1	3.136	.205	<.001	iM2	1.508	.143	<.001	iM3	4.010	.279	.001	iM4	.726	.099	<.001	iM5	1.188	.128	<.001	iy	1.293	.379	<.001					
		$R^2 = .020$				$R^2 = .012$				$R^2 = .020$				$R^2 = .021$				$R^2 = .028$				$R^2 = .474$							
		$F(1, 184) = 3.660$ $p = .057$				$F(1, 184) = 2.230$ $p = .131$				$F(1, 184) = 3.770$ $p = .054$				$F(1, 184) = 4.031$ $p = .046$				$F(1, 184) = 5.210$ $p = .024$				$F(6, 179) = 2163.78$ $p < .001$							

C' = Direct effect from X to Y controlling for the model mediators.



**Figure 2.** The direct effect of the intervention, where the various slopes show the indirect effects across the five factors for the syndromal sample.

## Discussion

There is notable value to using mediating variables in intervention outcome studies (Hayes, 2018). Employing path analyses, we examine the specific IE of five intermediary factors to explain NUPP-SA intervention program outcomes in a cluster randomized population-based sample of older children and young adolescents aged 11–14 years.

For the total sample, the NUPP-SA program has a broad effect, working significantly via the *assertiveness*, *physical/cognitive*, *public performance*, and *avoidance* factors, indicating that post-intervention, those in the intervention group were significantly more assertive and less scared, experienced fewer physical/cognitive symptoms, were more at ease in public performance situations, and were less avoidant compared with those in the nonintervention group. In contrast, the NUPP-SA works significantly via the public performance factor among the syndromal sample. Thus, our hypothesis that the NUPP-SA program showed significant and similar indirect effects across the five factors both for the syndromal group and the total sample was partially supported.

To our knowledge, this is the first study to disassemble the SPAI-C and examine the mediating effects of five factors. This data provides compelling evidence about how the NUPP-SA program affects young people across various levels of social anxiety symptoms, by reducing public performance anxiety. This applies to those in both the total and syndromal groups. The essential feature of SAD

is a marked or intense fear or anxiety about social situations in which the individual may be scrutinized by others (APA, 2013). Thus, in a society that requires increasing demands for self-presentation, reduced performance anxiety may considerably help children and adolescents in their development toward becoming self-confident, self-presenting individuals.

Unexpectedly, the NUPP-SA did not work significantly via social encounters for the syndromal or total sample. This factor consists of three SPAI-C items (*Scared at parties and go home early*; *Scared when I meet new kids*; and *Scared in the school cafeteria*), which may not apply to the age population we sampled. There are several reasons for this finding. First, this age group seldom attends parties without some parental/guardian arrangement and support. Further, few schools in Norway have a school cafeteria for students in this age range. Instead, students eat packed lunches in their classrooms. Second, the correlation coefficient (see Table 3) between the SCARED social anxiety subscale and the *social encounter* factor was relatively low, explaining 14.1% of the shared variance. This indicates that the two measures do not represent the social anxiety construct similarly. Third, while the NUPP-SA includes a psychoeducational and cognitive approach, it does not teach or apply social skills in social encounters in the same way as programs like SET-C (Beidel et al., 2004). The results herein indicate that incorporating a greater focus on positive social encounters may lead to even greater effectiveness for NUPP-SA. In a meta-analysis, Scaini et al. (2016) demonstrated larger effect sizes from outcome studies that include social skills training. However, including social skill training and peer generalization sessions in a universal preventive program may be challenging. Nevertheless, Beidel et al. (2021) showed that a web-based artificial intelligence application designed to replace peer generalization sessions is as effective as practicing in vivo social and peer generalization skills. Hence, the NUPP-SA program may benefit from adopting a web-based approach tailored to the individual, with specific skills based on their five-factor social anxiety profile.

Contrary to our expectations, the NUPP-SA works differently, in some ways, for the total and syndromal samples. While the NUPP-SA seems to work more generally for the former, its impacts were more specific within the latter. Although the original study showed large effect sizes for the syndromal sample (Aune & Stiles, 2009), the results from this study reveal that this effect is significantly mediated via the *public performance* factor. Possible explanations for the different effects between the total and syndromal samples may be the content and magnitude of the NUPP-SA. In their meta-analysis, Scaini et al. (2016) reported a significant moderating effect of the “number of treatment sessions” (p. 108) given with treatment studies administering more therapy sessions showing larger effect sizes. Larger effect sizes were also reported in studies that included social skills training (Scaini et al., 2016). The reported results from Scaini et al. (2016), Yang et al. (2019), and our findings indicate that the NUPP-SA works as an effective universal preventive intervention program for older children and young adolescents across social anxiety symptom

levels. However, for those with syndromal social anxiety or SAD, the NUPP-SA program may be extended successfully to include more social skills training sessions.

These findings also shed light on whether children and adolescents with SAD lack appropriate social skills (Beidel et al., 2010) or whether a deficit in social skills results from cognitive distortions that undermine their confidence in using them once acquired (Clark & Wells, 1995). Our findings indicate that a psychoeducation and cognitive intervention approach is helpful to those with subsyndromal social anxiety who suffer mainly from cognitive distortions and assumptions. Inversely, for those with syndromal social anxiety, who most likely meet SAD diagnostic criteria, social skills training, and peer generalization sessions may be necessary to achieve clinically significant treatment effects. The finding that the NUPP-SA works via public performance for those with syndromal social anxiety indicates that many young people may suffer from the DSM-5 (APA, 2013) performance-only specifier, but do not fear or avoid nonperformance social situations. However, this assumption must be tested in further investigations.

SAD is often underrecognized with long delays between symptom onset and treatment initiation (Nagata et al., 2015). Zarger and Rich (2016) found that only 13% of adolescents with SAD had ever disclosed their social fears to a healthcare professional. Moreover, adolescents are reluctant to receive treatment because of fear of stigma and negative evaluation. Furthermore, treatment effectiveness remains relatively low (Nagata et al., 2015). One possible reason for this is that treatments developed in academic settings may be inappropriate or infeasible for application in traditional clinical or community settings (Beidel et al., 2021). However, the results herein emphasize that we can significantly impact many children with subsyndromal and syndromal SAD through a multifactor intervention. The fact that a large portion of this population has difficulty with public speaking also supports the need for universal implementation.

Kessler et al. (2007) indicated that 50% of mental disorders emerge before the age of 14 and as much as 75% before the age of 24. Aune et al. (2022) have demonstrated that adolescents with subclinical social anxiety also report mental health issues over a range of areas, like those with a full-blown social anxiety disorder. Considering these facts, modeling estimates indicate that existing treatments can remove only a limited burden of SAD at the population level (Werner-Seidler et al., 2021). Thus, prevention might be the strategy to reduce SAD's disease burden. To legitimize the implementation of a prevention program upon an entire population justifies some ethical considerations. First, the prevalence of the targeted burden must be high. Secondly, few people seek treatment for the specific difficulty, and the effect of the treatment is low. Lastly, the intervention demonstrates an effect at all levels of the burden. The NUPP-SA seems to satisfy these assumptions.



*Strengths and limitations*

This study has several strengths and some limitations. This study included only two assessment points. More assessment points would have been beneficial to gain more information about the intervention mechanisms accounting for the detected effect. Thus, interpretations of causal relationships ought to be considered with caution. The original study by Aune and Stiles (2009) used a cluster-randomized intervention pre–post design with only one cluster per condition. However, the differences in levels of social anxiety between the two conditions at assessment point II could not be explained by either initial differences in demographic and clinical variables or by measures like stressful life events and bullying. A self-report measure was used to assess syndromal social anxiety; nevertheless, the correspondence between meeting SAD diagnostic criteria on the Anxiety Disorders Interview Schedule for Children and syndromal social anxiety on the SPAI-C is reasonably good (Aune et al., 2008). A population-based sample with relatively high participation was used, which allowed us to examine the intervention effects on different subgroups. Furthermore, IE estimation using a parallel multiple mediator model with the five SPAI-C factors allowed testing of each mechanism while simultaneously accounting for the between-factor associations.

*Clinical implications*

Primary prevention programs are increasingly important for reducing the impacts of chronic disorders and diseases on individuals, institutions, and society (Pigeot et al., 2010). According to Kessler et al. (2005), more attention should be directed to preventing primary disorders like SAD. Implementing an effective, universal preventive program like the NUPP-SA in schools (which offers ready access to young people and their families) offers opportunities that would be otherwise unavailable (Aune & Stiles, 2009). This investigation also has practical implications for developing efficient interventions by identifying and subsequently targeting critical program components. Moreover, dismantling how an intervention is conducted using various samples gives us valuable opportunities for customizing, rather than applying strictly manualized approaches. Ideally, doing so may help immunize young people against SAD, the most prominent, impairing, and costly childhood anxiety disorder.

**Conclusion**

The results indicate that the NUPP-SA works differently across the total sample compared to those with SAD symptoms (syndromal social anxiety). Compared to the control group, the NUPP-SA total intervention group demonstrated statistically significantly reduced social anxiety associated with becoming less

assertive, experiencing fewer somatic and cognitive symptoms, feeling more eased doing presentations, and showing less avoidance. In contrast, among those showing SAD symptoms, significantly reduced social anxiety is associated with decreased public performance anxiety. This indicates that the NUPP-SA has a significant universal impact on the most prominent social anxiety disorder symptom.

### **Authors' note**

**Declaration:** The authors declare that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in his paper.

**Conflict of interest:** None.

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