



Teaching Adolescents about Stress Using a Universal School-Based Psychoeducation Program: A Cluster Randomised Controlled Trial

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Abstract

Psychoeducation programs may increase knowledge about stress and help adolescents cope with stress. However, research about the effectiveness of psychoeducation programs about stress for adolescents is limited. The present study aimed to fill this gap by evaluating the effect of a brief school-based universal psychoeducation program about stress, the Stress Lessons, in terms of knowledge and experienced stress. A total of 1613 adolescents ($M=13.41$ years) from Dutch secondary schools participated. A cluster randomised controlled design was employed: classes were randomly assigned to an experimental or control condition. The experimental condition received three Stress Lessons between pre- and post-test. The Stress Lessons provided information about stress, how to recognize stress, and how to cope with and prevent stress. Questionnaires were used to assess knowledge about stress as well as experienced stress. Multilevel analyses were conducted to examine the effectiveness of the Stress Lessons and the moderating effect of gender, educational track, and ethnic background. Results showed that knowledge gain was significantly greater in the experimental than in the control condition. Experienced stress did not change due to the Stress Lessons. Moderator analyses revealed a larger effect of the Stress lessons in terms of knowledge about stress for girls compared to boys and for adolescents who followed academic compared to vocational education. Overall, the findings show that a brief psychoeducation program leads to a better understanding of stress. Therefore, it may be useful for schools to implement such programs to enhance adolescents' awareness.

Keywords Adolescents · Early secondary education · Psychoeducation · Stress

Introduction

Experiencing stress is part and parcel of adolescence. School is a major source of stress for many teenagers, as they tend to worry about their academic performance and their interaction with peers and teachers (De Vriendt et al., 2012; Vogelaar et al., 2024a). When adolescents experience stress for a prolonged period of time, it may threaten their well-being (Zimmer-Gembeck & Skinner, 2008), potentially leading to mental health problems, such as internalizing problems (Compas et al., 2012; Kim et al., 2003) and burnout complaints (Gerber et al., 2015). When these problems are recognised and treated early, this may increase the chance of a better long-term outcome (Jorm et al., 1997). Early recognition can be accomplished by teaching mental health literacy (Jorm et al., 1997), including the ability to recognise specific symptoms of disorders and knowledge of self-treatments, for example via psychoeducation programs. Therefore, it is imperative to develop feasible and effective

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school-based psychoeducation programs to address the experienced stress. This study investigates the effect of a brief school-based universal psychoeducation program about stress, the “Stress Lessons” program. The Stress Lessons were designed for adolescents in early secondary education aiming to provide, in three lessons, basic information about stress, how to recognize it, and how to cope with or to prevent it. Specifically, the aim of the current study was to evaluate the effect of the Stress Lessons in terms of knowledge about stress and experienced stress.

One of the main aims of psychoeducation programs is to increase knowledge about the topic of the program (Meredith et al., 2020; Midgett et al., 2015; Morgado et al., 2021; Portzky & van Heeringen, 2006; Shapiro et al., 2016; Varlow et al., 2009). Van Daele and colleagues (2012) stated that teaching and knowledge transfer should be key to a psychoeducation program. In terms of psychoeducation programs about stress for adolescent samples, previous research reported increases in factual knowledge about stress (Varlow et al., 2009) and self-perceived increases in knowledge about stress (Shapiro et al., 2016). Both studies used a single-session, adolescent-targeted universal psychoeducation intervention. However, neither study included a control condition, limiting the extent to which firm conclusions can be drawn regarding effectiveness of brief psychoeducational programs in terms of knowledge gain.

Two studies using longer-lasting stress prevention programs for adolescents also reported factual knowledge gains (Fridrici & Lohaus, 2009; Kiselica et al., 1994). These programs included a training focussing on stress management techniques and thus were not limited to psychoeducation. In addition, studies investigating universal psychoeducation programs about related topics such as anxiety and other mental health issues in adolescent samples show that knowledge of the specific topic increases following the intervention (Morgado et al., 2021; Portzky & van Heeringen, 2006; Tak et al., 2016). Hence, whilst the literature suggests an effect in terms of increased knowledge after a psychoeducational program, to date, no controlled study has been conducted to investigate knowledge gain after a brief program about stress in early adolescents. The current study aims to fill this gap.

Another important aim of psychoeducation programs is to teach people basic skills to manage and cope with symptoms such as stress (van Daele et al., 2012). Van Daele and colleagues (2012) conducted a meta-analytic review focusing on the effectiveness of psychoeducation programs on stress in the general population (age range 11–44 years) and the impact of several moderators on effectiveness including participant, intervention, and study design features. The interventions showed small increases as well as large decreases in stress after psychoeducation. Effectiveness

was moderated by intervention duration, suggesting larger effectiveness for shorter (< 12 h) than longer interventions (van Daele et al., 2012). The review did not suggest an optimal intervention duration for achieving stress reduction. In adults, even a single-session intervention about stress was found to be effective in reducing stress (Nosaka & Okamura, 2015). However, none of the studies in the meta-analytic review of van Daele and colleagues (2012) examined the effectiveness of a relatively short psychoeducation program in an adolescent sample using a controlled design. Therefore, we investigated whether a short, universal psychoeducation intervention provided for predominantly young adolescents (11 to 17 years) reduces self-reported overall and school-related stress (using a cluster randomised controlled design).

Not only is further research into the effectiveness of psychoeducation programs about stress on knowledge gain and stress reduction required, but also more studies should be performed to investigate differential effectiveness across demographic groupings. Knowledge about differential effectiveness can help tailor the suitability of programs to certain groups. Regarding participant characteristics as moderator of program effectiveness, van Daele and colleagues (2012) found that in terms of stress reduction, programs had larger effect sizes for women versus men. However, as recommended by van Daele and colleagues (2012), studies using a randomized controlled trial (RCT) are required to further investigate and potentially replicate this finding. Moreover, the two psychoeducation studies in adolescent samples did not find gender differences for knowledge gain (Shapiro et al., 2016; Varlow et al., 2009).

While gender differences have been examined, to date, we do not know if there are differential effects for other inter-individual groupings, such as educational track and ethnic background. In the Dutch secondary education system, adolescents are streamed after primary school, on average at 12 years of age, into separate tracks: practical education, pre-vocational education, senior general education, and pre-university education. Both practical and pre-vocational education last four years (Maslowski & van der Werf, 2017). Practical education prepares adolescents to start working directly after secondary school, and pre-vocational education gives access to senior vocational education. Senior general education lasts five years and gives access to higher professional education, while pre-university education lasts six years and gives access to university (Jeliazkova & Westerheijden, 2004). A previous study using the same sample and focused on baseline data (Vogelaar et al., 2024a) did not find differences in overall stress levels across educational tracks. In terms of specific stressors, the authors observed that adolescents in senior general and pre-university education reported higher stress levels about school

performance and school / leisure conflict than adolescents in practical and pre-vocational education. This is in line with other studies (Kleinjan et al., 2020; Stevens et al., 2017; Suldo et al., 2009). In the Netherlands, 28% of adolescents between the 10 and 15 years old has a migration background (Central Bureau of Statistics, 2022). Therefore, adolescents with a variety of ethnicities are present in the classroom. A previous study in this sample (Vogelaar et al., 2024a) did not find differences in overall stress across ethnic background groups. The authors did find that adolescents with a mixed ethnic background (e.g., Moroccan-Dutch) reported higher stress levels about school attendance and teacher interaction than adolescents with a Dutch-only ethnic background. In this study, given these differences in stress levels for educational track and ethnic background we deliberately recruited a large secondary school sample that included adolescents with a variety of educational tracks and ethnic backgrounds.

Finally, we explored the possibility that the effectiveness of the Stress Lessons on experienced stress is mediated by knowledge gain, as proposed by Kiselica et al. (1994). These authors hypothesized that knowledge about stress should lead to a reduction in stress. However, Kiselica and colleagues (1994) did not find evidence for this reasoning. Kiselica and colleagues (1994) argued that they might not have found a relationship between knowledge about stress inoculation and self-reported stress levels due to their small sample size or because a component other than knowledge predicted a reduction in stress levels. In the current study, we recruited a large enough sample in order to rule out the possibility that a lack of a mediation effect could be explained by an insufficiently powered sample.

The Present Study

The present study aimed to evaluate the effect of the Stress Lessons, a three-session universal psychoeducation program in secondary schools, in terms of knowledge about stress and experienced stress using a cluster RCT with a pre-test-post-test design. The Stress Lessons were developed to help adolescents gain more knowledge about stress, become aware of different ways in which stress can be experienced, understand how to cope with and prevent stress, and how to distinguish between positive and negative aspects of stress.

The current study addressed the following three research questions: (1a) do the Stress Lessons lead to an increase in knowledge about stress? (1b) is this effect the same across gender, educational track, and ethnic background groups?, (2a) do the Stress Lessons affect the reported overall and school-related stress level?, (2b) is this effect the same across gender, educational track, and ethnic background?, and (3) is the effect of the Stress Lessons on experienced stress mediated by knowledge gain? Based on previous literature

we expected that (1a) adolescents who followed the Stress Lessons would show a greater increase in knowledge about stress compared to those who did not follow the program. No specific hypothesis was formulated for research question 2a because contradictory findings were reported in the literature, varying between increases and decreases in stress levels after psychoeducation programs. We specifically developed the Stress Lessons to be suitable and understandable for a diverse population of adolescents. Therefore, in relation to 1b and 2b, we did not expect significant differences in knowledge and experienced stress across gender, educational track, and ethnic background groups. Lastly, with research question 3 we explored the possibility that the effect of the Stress Lessons on experienced stress was mediated by knowledge gain.

Methods

Participants

In total 1613 adolescents ($M=13.41$ years; $SD=0.90$ years; age range: 11 to 17 years; 49% boys) participated in the study. The participants were in the first ($n=926$; 57%), second ($n=439$; 27%), or third year ($n=248$; 15%) of nine secondary schools (equivalent to USA 7th, 8th, and 9th grade) located in one of the four largest cities of the Netherlands. The schools offer education at four levels (practical education ($n=56$; 4%), pre-vocational education ($n=716$; 44%), pre-vocational education / senior general education ($n=152$; 9%), senior general education / pre-university education ($n=689$; 43%). In our analyses, we merged the groups of practical education and pre-vocational / senior general education with the pre-vocational education group (henceforth we use the term “vocational education”; $n=924$; 57%) because the groups were too small to compare them separately with each other. In addition, these educational tracks are less focused on theory compared to the other levels. Further, henceforth we use the term “academic education” for the adolescents who follow senior general education / pre-university education ($n=689$; 43%). Regarding ethnic background, 50% of the sample perceived themselves as Dutch, 9% perceived themselves as non-Dutch, and 41% perceived themselves as mixed. The distribution of educational track and ethnic background was unequal, $\chi^2(2)=169.63$, $p<.001$. This indicates that more participants with a mixed and non-Dutch background followed vocational education and more participants with a Dutch background followed academic education.

We targeted schools with the explicit purpose of obtaining a diverse sample in terms of educational track and ethnic background. We approached approximately twenty schools

to participate in the study via a national network of different schools. A total of nine school leaders gave permission for their school's participation. The average household income in the neighborhood of the schools ranged between 21,900 and 54,400 euros in 2017 (Central Bureau of Statistics, 2019), which is comparable to low to middle household income. It is important to note that in the Netherlands, adolescents often do not live in the same postal code as their school. As the Stress Lessons were part of the school curriculum, all adolescents followed the lessons between April 2019 and March 2020. Parental and adolescent informed consent was required before an adolescent could participate in the research, that is, completing the questionnaires. Parents and adolescents were approached via letters and information folders between March 2019 till January 2020. In total, 2880 adolescents and their parents were approached to participate in the study via letters and information folders (see Fig. 1 for the flow chart of the study). 1643 adolescents and parents gave permission to participate in the study. The

distribution of the participating adolescents across school year and educational tracks is comparable to the distribution of adolescents who did not participate in the study.

Some participants were not present (due to illness) in class the day the questionnaires were completed and therefore did not participate either in the pre-test or the post-test session. In total, 264 participants were absent either during the pre-test ($n = 154$) or post-test ($n = 140$). In addition, 30 participants were absent during the pre- and the post-test, hence, these 30 participants were excluded from the sample. The remaining 1613 adolescents were included in all analyses. Regarding demographic information, seven participants did not report their ethnic background and one participant did not report date of birth or gender. Further, eight participants reported their gender and 198 participants their ethnic background differently during the pre- and post-test. Participants with missing or inconsistent demographics were excluded from analyses concerning these demographics (i.e., in these cases the demographic variable was set to

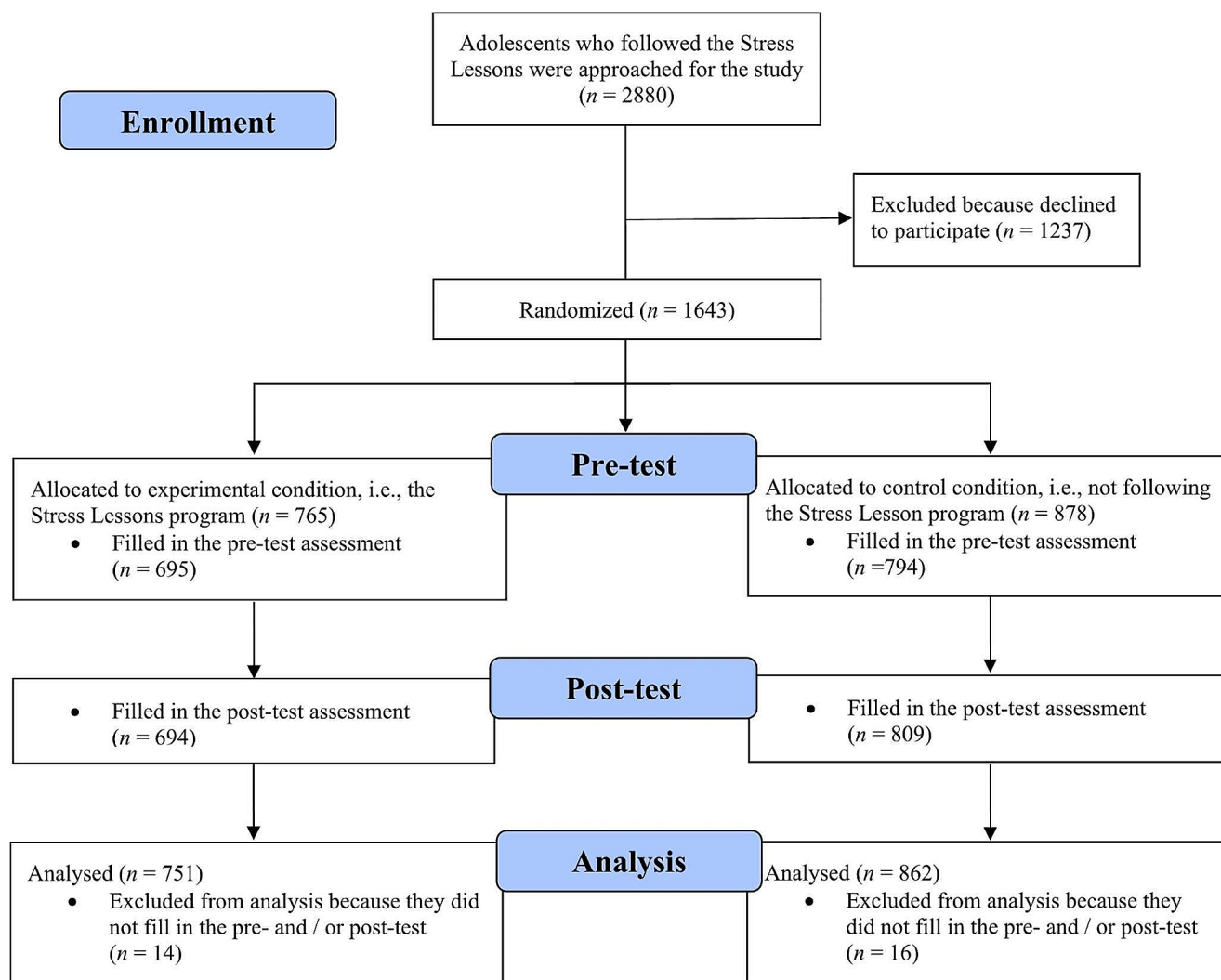


Fig. 1 Flow chart of the study

“missing”). No significant differences were found at pre-test between the cases with ($n=206$) and without ($n=1283$) missing demographic variables for knowledge ($t(292) = -0.43, p = .67$), overall stress ($t(267) = -0.78, p = .43$), and school-related stress ($t(269) = 0.30, p = .77$), indicating that participants with missing demographic variables did not answer significantly different to questions regarding knowledge and stress.

Participants who were absent at post-test ($n=139$) did not differ significantly at the pre-test in terms of knowledge ($t(126) = -0.40, p = .69$), overall stress ($t(127) = 0.38, p = .70$), and school-related stress ($t(126) = 0.84, p = .41$) compared to the adolescents who were not absent at post-test ($n=1474$). This indicates that the group of participants who remained in the study at post-test was not a selective sample with regard to these stress-related aspects.

The distribution of participants who were absent at post-test did not differ in terms of gender ($\chi^2(1) = 0.313, p = .58$) and educational track ($\chi^2(1) = 0.039, p = .84$), but did differ in terms of ethnic background ($\chi^2(2) = 7.630, p = .022$). Participants with a non-Dutch background were more likely to be absent during post-test than participants with a Dutch and mixed background.

Design

A cluster RCT was used, with the first author randomly and equally [1:1] allocating the school classes to an experimental ($n=765$; 63 classes) or a control condition ($n=878$; 63 classes; Fig. 1) by drawing lots, which was stratified by educational track and school year. The study followed a pre-test-post-test design with an experimental condition in which the Stress Lessons started immediately after the pre-test, and a control condition in which adolescents received no lessons

Table 1 Demographics, knowledge about stress, and experienced stress at pre-test and differences at pre-test between the experimental and control condition

	Experimental condition ($N=765$)	Control condition ($N=878$)	Differences at pre-test
	N (%)	N (%)	χ^2 (p)
Gender			
Girls	359 (48)	391 (52)	0.95 (0.33)
Educational track			
Vocational education	389 (46)	460 (54)	0.58 (0.45)
Ethnic background			2.64 (0.27)
Dutch	305 (48)	335 (52)	
Non-Dutch	226 (43)	300 (57)	
Mixed	54 (44)	68 (56)	
Variables	M (SD)	M (SD)	t (p)
Knowledge about stress	-0.05 (0.70)	-0.07 (0.73)	0.56 (0.58)
Overall stress	2.10 (0.70)	2.06 (0.69)	1.10 (0.27)
School-related stress	2.39 (0.88)	2.32 (0.84)	1.61 (0.11)

about stress in between pre- and post-test, but received the Stress Lessons after the post-test. The distribution of participants in the experimental condition did not differ from the control condition based upon gender ($\chi^2(1) = 0.95, p = .33$), educational track ($\chi^2(1) = 0.58, p = .45$), and ethnic background ($\chi^2(2) = 2.64, p = .27$; Table 1). Moreover, at pre-test there were no significant differences between participants in the experimental and control conditions on the measures of knowledge ($t(1476) = 0.56, p = .58$), overall stress ($t(1457) = 1.10, p = .27$), and school-related stress ($t(1445) = 1.61, p = .11$).

Procedure

Questionnaires were filled in on a computer using Qualtrics in the classroom or computer room with two researchers present. The participants were given 45 min to complete the questionnaire during both pre- and post-test. The participants were all working at their own desk hence sufficient privacy was guaranteed.

Stress Lessons

The main goal of the Stress Lessons was to teach adolescents about stress (i.e., how a body reacts to stress, how to recognize stress, and how to cope with and prevent stress). Adolescents participated in three weekly 45-minute classroom sessions that took place at the adolescents' schools. To broaden adolescents' knowledge, different topics were covered during the Stress Lessons, such as the definition of stress, the fight-or-flight response (Dhabhar, 2009; Sapolsky, 2009), what happens in the brain during stress (Maduka et al., 2015; Sapolsky, 2009), physiological responses to stress (Dhabhar, 2009; Romano, 1992; Sapolsky, 2009), and the difference between bad and good stress (Dhabhar, 2009; Kumari & Gartia, 2012; Olusoga et al., 2010). To teach adolescents how to recognize stress in their body, adolescents played games that evoked stress. After the game, the educator asked about their coping behaviour, physical reactions, and thoughts to make adolescents more aware of how to recognize stress. During the lessons the adolescents were exposed to breathing exercises (Varvogli & Darviri, 2011), muscle relaxation exercises (Varvogli & Darviri, 2011), and positive thinking (Varvogli & Darviri, 2011). The Stress Lessons had multiple learning activities, such as listening (e.g., listening to the educator and watching short videos; Hromek & Roffey, 2009), independent work (e.g., filling in a sociogram and writing down answers in a workbook; Romano, 1992), active input (e.g., sharing personal stressors; Hromek & Roffey, 2009), and practical tasks (e.g., playing games that evoke stress; Hromek & Roffey, 2009).

Before the Stress Lessons were finalized, pilots took place. The pilots were evaluated by teachers and adolescents. A total of 317 adolescents participated in the pilots and came from three schools that also participated in the current study. The groups were comparable to the sample of the current study in terms of gender (pilot: male = 49%; current study: male = 49%) and age (pilot: $M = 13.91$ years; current study: $M = 13.41$ years). The pilot sample did include more adolescents from vocational (79%) than the current study (57%) and more adolescents in the pilot sample perceived themselves as mixed (63%) and less as Dutch (25%) compared to the current study (mixed: 41%, Dutch: 50%). By including more adolescents who follow vocational education and adolescents who perceive themselves as mixed, we were able to adapt the Stress Lessons for these adolescents. Based upon the feedback, the Stress Lessons were adapted to be suitable for three different educational tracks (i.e., practical education, pre-vocational education, and senior general / pre-university education), where language use, amount of theory related to activities, homework, and difficulty of the topics were adjusted accordingly. For example, for classes in the practical track we explained what happens in the body during a stress response (e.g., fastened heartbeat, breathing faster). In classes from the theoretical track we, in addition, explained which hormones (i.e., adrenalin and cortisol) are activated during the stress response.

The sessions were delivered by trained university students at the master level (79%), PhD candidates (11%), or by the class mentor (10%). The components that were discussed during the Stress Lessons were reported by the person who gave or observed the lesson. In total, in 62% of the Stress Lessons all lesson components were correctly implemented. In the other 38%, at least one of the important components of the lesson (e.g., muscle relaxation exercise) was not performed due to lack of time. The three Stress Lessons consisted of 21 components in total. 17% of these classes missed one component, 5% of the classes missed two components, 6% missed three components, 3% missed four components, 2% missed five components, 3% missed six components, and 2% missed eight components. The Stress Lessons comply with the minimum levels of program integrity (i.e., 60%) that is needed to reach program effectiveness

(Durlak & Dupre, 2008). Thus, despite omissions it can be assumed that each of the participants received an adequate dose of Stress Lessons. We did find that the amount of complete and incomplete lessons was unequal between educational tracks, $\chi^2(1) = 5.68, p = .02$. This indicates that more incomplete Stress Lessons were given to adolescents from vocational education than to adolescents from academic education (Table 2). Yet, our program complies with the minimum levels of program integrity (Durlak & Dupre, 2008).

Materials

Knowledge about Stress

Knowledge about stress was measured during the pre- and post-test with the Stress Knowledge Questionnaire (SKQ), specifically developed for this study. The SKQ consists of 10 items with eight multiple choice and two open questions about subjects that are emphasized during the three Stress Lessons for all three educational tracks. The multiple-choice questions have 3 or 4 response options, with the last option always being "I do not know". For example, the first item is "Finish the following sentence with one of the options: A fight- or flight response is a physiological reaction that people have when they (a) are in danger, (b) are in love, (c) play tennis, and (d) I do not know." The answers to all multiple choice and open questions were scored as either true or false. The open questions were coded as either true or false by two independent raters and had a moderate (question 9; $\kappa = 0.76$) and high interrater reliability (question 7b; $\kappa = 0.94$).

Overall and School-Related Stress

Overall and school-related stress were assessed during the pre- and post-test with the short Dutch version of the Adolescent Stress Questionnaire (ASQ-S; Anniko et al., 2018). The questionnaire contains 27 items, divided across nine different scales. The nine scales are home life, school performance, school attendance, romantic relationships, peer pressure, teacher interaction, future uncertainty, school / leisure conflict, and financial pressure (α of the 27 items = 0.92 at pre-test and $\alpha = 0.93$ at post-test). The ASQ-S is a reliable tool and is measurement invariant for gender, educational tracks, and ethnic backgrounds (Anniko et al., 2018; McKay et al., 2019; Vogelaar et al., 2024b). School-related stress was assessed by merging four ASQ-S scales, including school attendance, school performance, teacher interaction, and school / leisure conflict (α of the four scales, i.e., 11 items, = 0.87 at pre-test and $\alpha = 0.88$ at post-test). The questions (e.g., "I worry about my future") are answered on

Table 2 Distribution of adolescents by educational track and (in)complete Stress Lessons

	(In)complete Stress Lessons		Total
	Complete	Incomplete	
Educational track	21	20	41
Vocational			
Academic	18	4	22
Total	39	24	63

Note. Vocational = practical and prevocational education. Academic = senior general and preuniversity education

a 5-point Likert type scale, ranging from does not apply or is irrelevant to me to very stressful (1–5).

Self-perceived Ethnic Background

Self-perceived ethnic background is operationalized as an individual's sense of belonging to a particular ethnic group, including customs, history, and/or religion (Burchard et al., 2003). Although most of our participants were born in the Netherlands, their country of birth does not always reflect the ethnic background they perceive themselves as belonging to (Stronks et al., 2009). In the present study, self-perceived ethnic background was operationalized by asking participants: "with which cultural background do you feel most connected?" (during pre- and post-test). Adolescents were given the answer options: Dutch, Turkish / Dutch, Antillean / Dutch, Moroccan / Dutch, or Surinam / Dutch, and an "other" option to write down their own ethnic background. Adolescents reported a total of 85 unique ethnic backgrounds. This large variety did not allow for meaningful subgroup analyses, given power problems in the individual groups, hence three groups were created: (a) Dutch, (b) non-Dutch (e.g., Moroccan, Moroccan-Turkish), and (c) mixed (e.g., Moroccan-Dutch, Turkish-Dutch), based on the rationale that what the non-Dutch adolescents have in common is that being Dutch does not seem to be a part of their self-perceived ethnic background.

Statistical Analyses

Analyses were performed in IBM SPSS statistics 27 and R version 4.1.2. First, an Item Response Theory (IRT) analysis was conducted to check the validity of the SKQ items and to identify poor performing items. IRT estimates each item's difficulty and discrimination on the latent trait (Spence et al., 2012). The item's difficulty corresponds to the likelihood of an individual endorsing it given their level of the latent trait (i.e., knowledge about stress; Spence et al., 2012). An item is considered easy if most people endorse it and the difficulty rises as the likelihood of endorsing it decreases. An item's discrimination reflects the probability of endorsing an item as the level of the underlying trait increases (Spence et al., 2012). Thus, highly discriminating items represent the latent trait more strongly. Baker (2001) produced guidelines for judging item discrimination levels: moderate discrimination is achieved if the parameter is between 0.65 and 1.34 and high discrimination if the parameter is between 1.35 and 1.69. Based upon the discrimination parameter, a knowledge (theta) score can be calculated for each participant, with the items that are more discriminating having more weight (Gorter et al., 2015). We applied the one-parameter logistic (i.e., item difficulty; 1PL) and the two-parameter

logistic (i.e., item difficulty and discrimination; 2PL) model using the item scores from both the pre- and post-test. The goodness of fit of these two models was compared with the likelihood ratio test (LRT). The model with the best fit has the lowest Akaike information criterion (AIC) and Bayesian information criterion (BIC).

To answer the first and second research questions, longitudinal multilevel analyses were conducted in R with knowledge about stress, overall stress, and school-related stress as dependent variables. Level 1 included time (i.e., pre-test coded as 0 and post-test coded as 1) and level 2 the participant ID. We controlled for schools and classes of the participants in all models by adding the variables as random effects with classes as level 3 and schools as level 4. The random intercepts and random slope were removed when they were not significant. The AIC and BIC define the complexity of a model and account therefore for the number of parameters in the model and for sample size. Models with a smaller deviance fit better. Model A was an unconditional means model with knowledge about stress, overall stress and school-related stress as dependent variables and no predictors at any level. In model B, time (i.e., pre- and post-test) was added. Each individual's slope from the mean slope was added to model C (i.e., random slope for time). In Model D, study condition (i.e., experimental and control condition) was added. The interaction between time and condition was added to Model E. Model F included the demographic variables (i.e., gender, educational track, or ethnic background). The interaction between time, condition, and demographic variables were added in Model G. Educational track and ethnic background were correlated and were therefore both added at the same time in Model F and G. As treatment effect sizes, Cohen's *d*'s were calculated for each of the dependent variables using an online effect size calculator (Wilson n.d.), by entering the mean change from pre- to post-test between conditions. Small effect sizes were considered $d=0.20$, medium effect sizes $d=0.50$ and large effect sizes $d=0.80$ (Cohen, 1988).

To answer research question 3, two regression analyses were performed to test the mediating effect of knowledge about stress on change in overall stress from pre- to post-test. Specifically, the bootstrapping technique for testing mediation (Preacher & Hayes, 2004) with the Hayes' Process macro for SPSS was used (Hayes, 2017). The macro uses ordinary least squares analyses for estimating the mediation (i.e., indirect) effect, and bootstrapping for estimating the 95% confidence intervals (CI) based on 5000 bootstrap samples around the indirect effect. In the first regression analysis, the knowledge at post-test (mediator) was regressed on condition, controlling for the knowledge at pre-test (covariate). In the second regression analysis, overall stress score at post-test was the dependent variable

Y, condition was the independent variable X, knowledge at post-test the mediator, and knowledge score at pre-test and overall stress at pre-test were added as the covariates. This approach provides the indirect effect estimate. When the CI does not include zero, the effect is interpreted as significant.

Results

Item Validity Stress Knowledge Questionnaire

The results of the IRT showed that the 2PL model made a significant improvement in fit compared to the 1PL model ($p < .001$) and was therefore considered as the better model

Table 3 Likelihood Ratio Test and Item parameters for the knowledge items

	CTT-statistic		IRT-Item parameters	
	1PL	2PL	1PL	2PL
AIC	27878.78	27542.21		
BIC	27938.81	27662.28		
Loglikelihood	-13929.39	-13751.10		
df		10		
LRT		335.57***		
	1PL	2PL		
Knowledge items	Probability of valid solution	Difficulty	Discrimination	
1. Fight and flight response	0.922	-1.913	1.463	
2. Increase in heart rate during a stress response	0.889	-1.497	1.695	
3. Dilated pupils during a stress response	0.252	2.178	0.430	
4. Perfectionists experience more often stress	0.865	-1.301	1.793	
5. Sleepless nights during a stress response	0.940	-1.944	1.720	
6. Increase in rumination during stress	0.770	-1.082	1.177	
7. When stress is good or bad	0.584	-0.337	1.031	
7b. Difference between bad and good stress	0.045	1.874	2.389	
8. Order in a stress process	0.458	0.170	0.918	
9. Tip to release stress	0.217	2.527	0.440	

Note. CTT-statistics=Classical test theory. 1PL=one-parameter logistic model, 2PL=two-parameter logistic model. AIC=Akaike's Information Criterion. BIC=Bayesian Information Criterion. LRT=likelihood ratio test. Items in bold achieve at least moderate discrimination ($a > 0.65$). The ones below zero are the easy items and above zero the difficult items. Item 7b and 9 were open questions and the other eight items were multiple choice questions.

(Table 3). Four relatively difficult and six easier items were found. Table 3 shows that item 9 (i.e., tip to release stress) was the most difficult item ($\beta = 2.527$) and item 5 (i.e., sleepless nights during a stress response) the least difficult ($\beta = -1.944$). Item 7b (i.e., difference between bad and good stress) showed the highest discrimination ($\alpha = 2.389$) and item 3 (i.e., dilated pupils during a stress response) the lowest ($\alpha = 0.430$), indicating that item 7b is a better item to distinguish between those with greater and those with less knowledge about stress. Based upon the discrimination parameters of all ten items, the knowledge (standardized) scores were calculated for each participant, with the items that were more discriminating having more weight. The scores ranged from -2.36 to 1.94 and were used for further analyses, with higher scores indicating higher knowledge scores.

Knowledge about Stress

Research question 1a asked "do the Stress Lessons lead to an increase in knowledge of stress?" In line with expectations, the results demonstrated a significant interaction between time (i.e., pre- and post-test) and condition (i.e., Stress Lessons yes/no) for knowledge about stress ($\gamma_{110} = 0.372$, $p < .001$; Table 4). Follow-up analyses showed that adolescents in the experimental condition increased in knowledge, as shown by a higher knowledge score at post- ($M = 0.29$) versus pre-test ($M = -0.05$); $t(1387) = 7.78$, $p < .001$, while adolescents in the control condition did not change in their knowledge level from pre- ($M = -0.07$) to post-test ($M = -0.14$; $t(1599) = -1.85$, $p = .06$). The difference in knowledge gain from pre- to post-test between the experimental condition and control condition was 0.41 , indicating a positive effect of the Stress Lessons with a small to medium effect size ($d = 0.35$).

Research question 1b asked "is this effect the same across gender, educational track, and ethnic background groups?" Contrary to expectations, a significant 3-way interaction effect was found between time, condition, and gender ($\gamma_{111} = 0.167$, $p = .03$; Fig. 2a). Follow-up analyses showed that the difference in knowledge gain from pre- to post-test between the experimental and control condition (M_{dif}) was larger for girls ($M_{dif} = 0.49$; $t(690) = 8.45$, $p < .001$, $d = 0.64$) than for boys ($M_{dif} = 0.28$; $t(677) = 4.90$, $p < .001$, $d = 0.38$), which are considered medium to large and small to medium effect sizes, respectively. This indicates that the Stress Lessons showed a positive effect with regard to knowledge about stress for both groups and this effect was larger for girls than for boys. Moreover, a significant 3-way interaction effect between time, condition, and educational track was found ($\gamma_{111} = -0.421$, $p < .001$; Fig. 2b). Follow-up analyses demonstrated that adolescents

Table 4 Estimated values for the parameters of the models for knowledge about stress

Parameter	Gender						Educational track		Ethnic background		
	Model A	Model B	Model C	Model D	Model E	Model F	Model G	Model F	Model G	Model F	Model G
Intercept (γ_{000})	-0.133	-0.195	-0.184	-0.265*	-0.195	-0.271*	-0.288*	-0.256***	-0.255***	-0.256***	-0.265***
Time (γ_{100})		0.123***	0.111**	0.112**	-0.063	-0.060	-0.012	-0.066	-0.060	-0.066	-0.064
Condition (γ_{010})				0.160**	0.012	0.003	0.027	0.015	0.083	0.015	0.003
Time * Condition (γ_{110})					0.372***	0.370***	0.285***	0.377***	0.214**	0.377***	0.434***
Demographic variable (γ_{001})						0.159***	0.191***	0.519***	0.516***	-0.082***	-0.074*
Time * Demographic variable (γ_{101})							-0.098		-0.014		0.002
Condition * Demographic variable (γ_{011})							-0.047		-0.172		0.013
Time * Condition * Demographic variable (γ_{111})							0.167*		-0.421***		-0.060
Residual (σ^2_e)	0.316	0.308	0.256	0.256	0.257	0.257	0.256	0.255	0.256	0.255	0.255
Intercept variance ID (σ^2_o)	0.154	0.159	0.186	0.186	0.185	0.179	0.180	0.198	0.198	0.198	0.198
Intercept variance class (σ^2_o)	0.079	0.080	0.071	0.078	0.072	0.076	0.076	0.045	0.041	0.045	0.045
Intercept variance school (σ^2_o)	0.066	0.066	0.057	0.061	0.061	0.063	0.063	0.012	0.012	0.012	0.012
Slope variance (σ^2_i)			0.104	0.104	0.065	0.067	0.066	0.074	0.051	0.074	0.070
Correlation (ρ_{01})			-0.21	-0.40	-0.29	-0.32	-0.31	-0.54	-0.49	-0.54	-0.54
Loglikelihood	-3132.3	-3114.7	-3048.7	-3045.8	-3030.3	-3000.8	-2998.2	-2623.4	-2614.0	-2623.4	-2621.9
Deviance	6264.5	6229.3	6097.4	6091.6	6060.6	6001.5	5996.3	5246.8	5227.9	5246.8	5243.8
df _{residuals}	2987	2986	2984	2983	2982	2964	2961	2577	2574	2577	2574
AIC	6274.5	6241.3	6113.4	6109.6	6080.6	6023.5	6024.3	5270.8	5257.9	5270.8	5273.8
BIC	6304.5	6277.4	6161.4	6163.6	6140.6	6089.5	6108.3	5341.1	5345.8	5341.1	5361.7

Note. AIC = Akaike’s Information Criterion. BIC = Bayesian Information Criterion. * $p < .05$, ** $p < .01$, *** $p < .001$. Time = pre- and post-test. Condition = experimental and control condition.

in academic education ($M_{dif}=0.64$; $t(592)=11.31$, $p < .001$, $d=0.93$) experienced stronger knowledge gains from the Stress Lessons than adolescents in vocational education ($M_{dif}=0.19$; $t(783)=3.44$, $p = .001$, $d=0.25$), with a large and small effect, respectively. This indicates that the Stress lessons showed a positive effect with regard to knowledge about stress for both types of education, but this effect was larger for those following academic education compared to vocational education. As the distribution of (in)complete lessons and educational track was unequal, we controlled for (in)complete lessons by adding (in)complete lessons as level 5 to the model. Still, a significant 3-way interaction effect between time, condition, and educational track was found ($\gamma_{111} = -0.421$, $p < .001$), indicating that whether or not the Stress Lessons were completed did not influence the result. Ethnic background did not moderate program effectiveness, indicating that adolescents from different ethnic backgrounds did not differ in terms of their gained knowledge after the Stress Lessons.

Overall and School-Related Stress

Research question 2a asked “do the Stress Lessons affect the reported overall and school-related stress level?” The results showed a significant time (i.e., pre- and post-test) by condition (i.e., Stress Lessons yes/no) interaction effect for overall stress ($\gamma_{110}=0.135$, $p < .001$; Table 5) and school-related stress ($\gamma_{110}=0.170$, $p < .001$; Table 6). The adolescents in the experimental condition did not report changes in overall stress ($t(1382)=0.96$, $p = .34$; Fig. 2c) and school-related stress ($t(1385)=1.50$, $p = .13$; Fig. 2d) from pre- (overall stress: $M=2.10$, school-related stress: $M=2.39$) to post-test (overall stress: $M=2.13$, school-related stress: $M=2.46$). In contrast, adolescents in the control condition reported reduced overall stress ($t(1599) = -2.92$, $p = .004$) and lower school-related stress ($t(1599) = -2.48$, $p = .01$) from pre- (overall stress: $M=2.06$, school-related stress: $M=2.31$) to post-test (overall stress: $M=1.96$, school-related stress: $M=2.21$). Research question 2b asked “is this

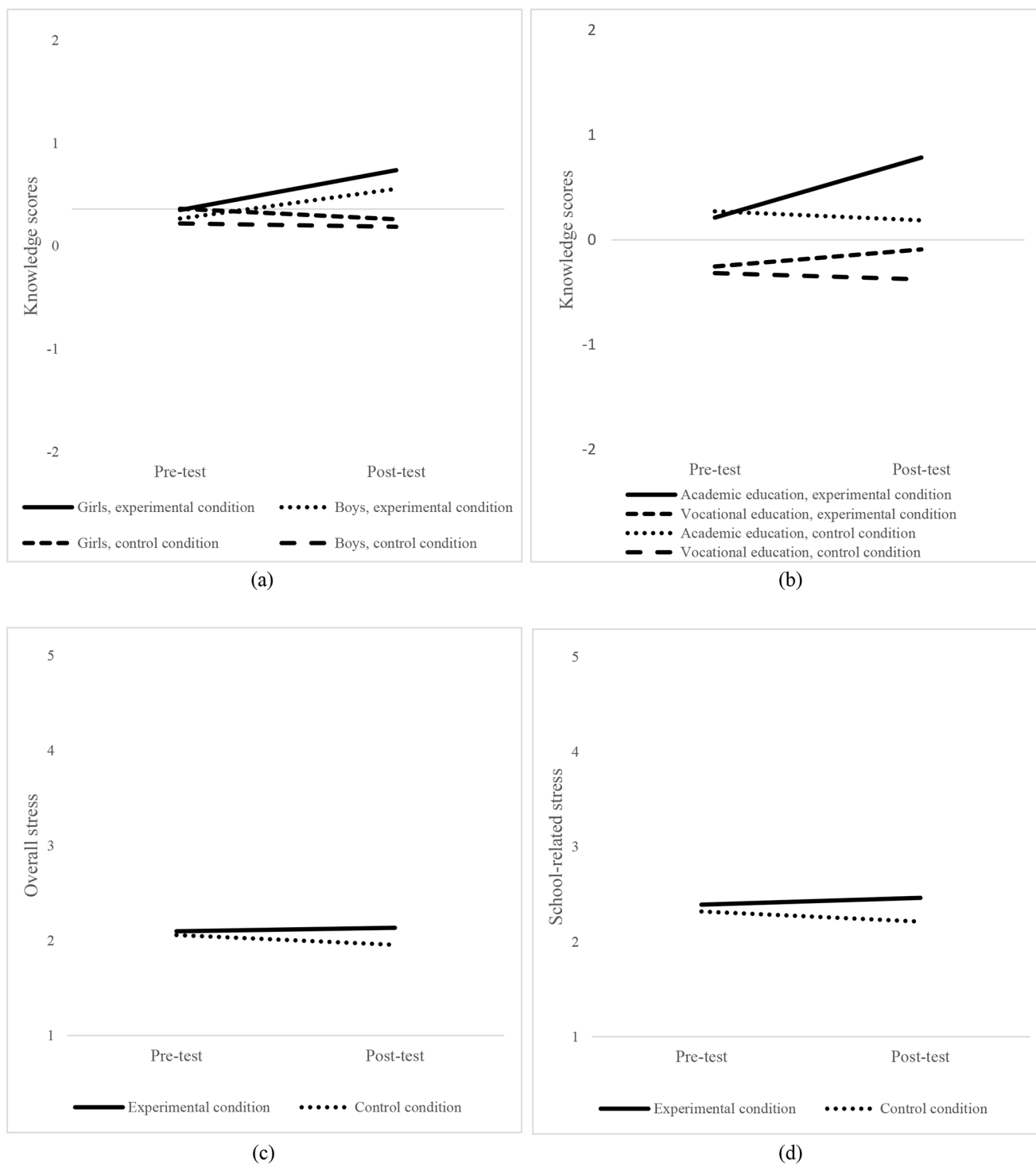


Fig. 2 Knowledge scores between pre- and post-test and by condition (a) across gender and (b) educational track. (c) Overall stress and (d) school-related stress between pre- and post-test by condition. Note. Time = pre- and post-test. Condition = experimental and control condition

effect the same across gender, educational track, and ethnic background?” No significant three-way interaction effects with the demographic variables were found, indicating that the effect of the Stress Lessons on experienced stress did not differ for the different demographic groups.

Knowledge and Stress Levels

Research question 3 asked “is the effect of the Stress Lessons on experienced stress mediated by knowledge gain?”

Table 5 Estimated values for the parameters of the models for overall stress

Parameter	Gender						Educational track		Ethnic background		
	Model A	Model B	Model C	Model D	Model E	Model F	Model G	Model F	Model G	Model F	Model G
Intercept (γ_{000})	2.045***	2.062***	2.062***	2.007***	2.039***	1.953***	1.963***	1.965***	1.944***	1.965***	1.991***
Time (γ_{100})		-0.032*	-0.032*	-0.032*	-0.095***	-0.094***	-0.101***	-0.097***	-0.097***	-0.097***	-0.112***
Condition (γ_{010})				0.116*	0.047	0.036	0.026	0.078	0.110	0.078	0.035
Time * Condition (γ_{110})					0.135***	0.136***	0.127***	0.130***	0.158***	0.130***	0.137***
Demographic variable (γ_{001})						0.176***	0.157**	0.068	0.121	0.032	0.005
Time * Demographic variable (γ_{101})							0.014		-0.001		0.016
Condition * Demographic variable (γ_{011})							0.021		-0.083		0.044
Time * Condition * Demographic variable (γ_{111})							0.015		-0.063		-0.007
Residual (σ^2_e)	0.124	0.124	0.124	0.124	0.121	0.121	0.121	0.119	0.119	0.119	0.119
Intercept variance ID (σ^2_o)	0.350	0.350	0.350	0.350	0.351	0.341	0.341	0.351	0.351	0.351	0.351
Intercept variance class (σ^2_o)	0.038	0.037	0.037	0.034	0.034	0.033	0.033	0.030	0.029	0.030	0.030
Loglikelihood	-2629.7	-2626.7	-2626.7	-2623.8	-2610.7	-2573.2	-2572.8	-2248.3	-2246.5	-2248.3	-2247.4
Deviance	5259.3	5253.4	5253.4	5247.6	5221.4	5146.5	5145.6	4496.6	4493.0	4496.6	4494.8
df _{residuals}	2986	2985	2985	2984	2983	2965	2962	2579	2576	2579	2576
AIC	5267.3	5263.4	5263.4	5259.6	5235.4	5162.5	5167.6	4514.6	4517.0	4514.6	4518.8
BIC	5291.3	5293.4	5293.4	5295.6	5277.4	5210.5	5233.6	4567.3	4587.3	4567.3	4589.1

Note. AIC = Akaike’s Information Criterion. BIC = Bayesian Information Criterion. * $p < .05$, ** $p < .01$, *** $p < .001$. Time = pre- and post-test. Condition = experimental and control condition.

In the first regression analysis, we found that condition was a significant predictor for knowledge at post-test ($b_1 = 0.40$, $t = 10.61$, $p < .001$), controlling for knowledge at pre-test. This indicates that adolescents following the Stress Lessons (i.e., experimental condition) gained more knowledge about stress compared to the adolescents who had not received the Stress Lessons (i.e., control condition). In the second regression analysis, after controlling for knowledge and overall stress at pre-test, condition was a significant predictor ($b_2 = 0.13$, $t = 5.03$, $p < .001$) but knowledge at post-test was not ($b_3 = 0.01$, $t = 0.80$, $p = .42$). Furthermore, the indirect effect was not significant ($b_1 * b_3 = 0.01$, 95% CI = [-0.011, 0.022]). Taken together, results indicate that knowledge about stress does not mediate the effect between condition and overall stress at post-test.

Discussion

The aim of this study was to investigate the effects of the Stress Lessons – a universal psychoeducation program about stress – in terms of knowledge and experienced stress in a large sample of adolescents across gender, educational

tracks, and ethnic backgrounds. The study employed a cluster RCT with a pre-test-post-test design. The results showed that adolescents in the experimental condition gained knowledge about stress, while adolescents in the control condition did not change in their knowledge level, indicating a positive effect of the program. Moreover, we found increased knowledge for boys and girls, academic and vocational education, as well as for Dutch, non-Dutch, and mixed ethnic background. Moderator effects revealed that on average, girls in the experimental condition gained more knowledge in comparison to boys. On average, adolescents who followed academic education gained more knowledge than adolescents who followed vocational education. Ethnic background did not moderate program effectiveness, indicating that adolescents from different ethnic backgrounds did not differ in terms of their gained knowledge after the Stress Lessons. Regarding experienced stress we found that adolescents in the experimental condition showed stable levels of self-reported overall and school-related stress, whereas these levels declined in the control condition. The findings for experienced stress were not influenced by any of the demographic groupings. Lastly, we found that

Table 6 Estimated values for the parameters of the models for stress levels regarding school-related stress

Parameter	Gender							Educational track		Ethnic background	
	Model A	Model B	Model C	Model D	Model E	Model F	Model G	Model F	Model G	Model F	Model G
Intercept (γ_{000})	2.313***	2.319***	2.319***	2.243***	2.283***	2.208***	2.218***	2.129***	2.115***	2.129***	2.146***
Time (γ_{100})		-0.013	-0.013	-0.013	-0.092***	-0.090***	-0.103**	-0.107***	-0.120***	-0.107***	-0.097**
Condition (γ_{010})				0.159**	-0.074	0.064	0.080	0.097	0.117	0.097	0.063
Time * Condition (γ_{110})					0.170***	0.170***	0.125*	0.186***	0.230***	0.186***	0.155**
Demographic variable (γ_{001})						0.155***	0.136*	0.209**	0.243*	0.082**	0.065
Time * Demographic variable (γ_{101})							0.026		-0.029		-0.011
Condition * Demographic variable (γ_{011})							-0.030		-0.057		0.034
Time * Condition * Demographic variable (γ_{111})							0.085		-0.100		-0.035
Residual (σ^2_ϵ)	0.210	0.210	0.210	0.210	0.207	0.207	0.206	0.204	0.204	0.204	0.204
Intercept variance ID ($\sigma^2_{\epsilon_0}$)	0.480	0.480	0.480	0.481	0.481	0.475	0.475	0.476	0.476	0.476	0.475
Intercept variance class ($\sigma^2_{\epsilon_c}$)	0.069	0.069	0.069	0.061	0.062	0.058	0.058	0.051	0.050	0.051	0.051
Intercept variance school ($\sigma^2_{\epsilon_s}$)	0.010	0.010	0.010	0.011	0.011	0.012	0.012	0.010	0.010	0.010	0.010
Loglikelihood	-3291.2	-3290.9	-3290.9	-3287.5	-3275.4	-3246.6	-3244.0	-2818.6	-2817.2	-2818.6	-2817.6
Deviance	6582.3	6581.7	6581.7	6575.1	6550.8	6493.2	6488.0	5637.2	5634.5	5637.2	5635.2
df _{residuals}	2985	2984	2984	2983	2982	2964	2961	2578	2575	2578	2575
AIC	6592.3	6593.7	6593.7	6589.1	6566.8	6511.2	6512.0	5657.2	5660.5	5657.2	5661.2
BIC	6622.3	6629.8	6629.8	6631.1	6614.8	6565.2	6584.0	5715.8	5736.6	5715.8	5737.4

Note. AIC = Akaike's Information Criterion. BIC = Bayesian Information Criterion. * $p < .05$, ** $p < .01$, *** $p < .001$. Time = pre- and post-test. Condition = experimental and control condition.

knowledge about stress does not mediate the effect between condition and overall stress at post-test.

In line with expectations, our findings showed that the Stress Lessons led to an increase in knowledge about stress. Previous literature also showed that educating about stress increases knowledge about stress (Varlow et al., 2009). However, Varlow and colleagues (2009) did not include a control condition and therefore it was unknown whether knowledge gain was achieved due to the psychoeducation course about stress. The current study using a cluster RCT also found that a brief psychoeducation program about stress is helpful for young adolescents to gain more understanding of stress. Due to the RCT design, we can fairly confidently say that the knowledge increase is attributable to the Stress Lessons and not to other factors.

The Stress Lessons were effective for both girls and boys, but the strength of the effect was significantly larger for girls than for boys in terms of gained knowledge about stress. In contrast, Varlow and colleagues (2009) did not find a difference in knowledge gain between boys and girls. No gender

differences might have been found because Varlow and colleagues (2009) included only a one-hour psychoeducation program. A longer program, like the Stress Lessons, might have made the differences between boys and girls visible. Previous research by Van Houtte (2004) also found that girls performed better than boys in school subjects, which may also apply to gaining knowledge about stress. In order to make the Stress Lessons more suitable for boys, the Stress Lessons could add for example more game-based learning (e.g., using Virtual Reality (VR), as two studies indicated that boys might be more motivated by competition and girls by social stimuli (de Witte & Haan, 2013; Driessen & van Langen, 2013).

The current study is, to our knowledge, the first that investigated differences across ethnic background groups and educational tracks in terms of knowledge gain about stress after a psychoeducation program. Regarding the former we found that knowledge gain did not differ based upon ethnic background; that the Stress Lessons were equally effective for each ethnic background group in terms of gained

knowledge. This finding indicates that the Stress Lessons could be applied in schools with varying ethnic background composition among their pupils. This is especially important as a sizeable group of adolescents in the Netherlands have a migration background (28% of adolescents between the 10 and 15 years old; Central Bureau of Statistics, 2022).

Regarding educational track, this study showed that adolescents who followed academic education showed more knowledge gain than their peers in vocational education. Students following academic education might process a certain type of information differently than students following vocational education. It seems that the content of the Stress Lessons or the way the Stress Lessons were presented matched more with what is learned normally at school in the academic track than the vocational track, making it more familiar, and therefore easier to learn. It is therefore possible that the Stress Lessons did not sufficiently address the needs of adolescents who followed vocational education, even though language use, amount of theory related to activities, homework, and difficulty of the topics were adjusted. In order for adolescents who follow vocational education to gain more knowledge, the Stress Lessons could be made less theoretical for example, by adding more game-based learning (e.g., VR) into the Stress Lessons. According to Schmitz and colleagues (2015), teachers of vocational education adolescents often struggle with engaging adolescents in a meaningful way during class and they prefer learning via technologies that they are familiar with (e.g., mobile). Another option could be to divide the components of the Stress Lessons across more lessons, as adolescents who follow practical education may have received too much information at once.

Regarding experienced stress levels, we found that the lessons did not change the levels of self-reported overall and school-related stress, while the control condition showed reduced levels of stress over time. The effect of the program was comparable across subgroups, that is, gender, educational tracks, and ethnic backgrounds. This finding is in line with the meta-analysis by van Loon and colleagues (2020), in which the authors found that universal school-based interventions for adolescents were not effective in reducing stress, whereas targeted interventions for at-risk adolescents were. By contrast, the meta-analytic review of van Daele and colleagues (2012) found on average a small reduction of stress after universal psychoeducation programs. It is important to note that none of the studies included in the meta-analytic review by van Daele and colleagues (2012) examined the effectiveness of a relatively short psychoeducation program in an adolescent sample using a controlled design. Therefore, none of the studies was comparable to the current study. The significant decrease in overall and school-related stress in the control condition from pre- to

post-test might be due to a test-retest effect, that is, repeated administration of the same test without an intervention in between. Windle (1954) found that there is the tendency to show improved adjustment when filling in a personality questionnaires multiple times without an intervention. Since then, spontaneous improved adjustment has been found in multiple studies using mental health questionnaires (e.g., Arrindell, 2001; Choquette & Hesselbrock, 1987; Ormel et al., 1989).

Finally, we examined whether the effect of the Stress Lessons in terms of stress levels was explained by knowledge gains. Our results are in line with Kiselica and colleagues (1994), who did not find an association between knowledge gains and self-reported stress levels. We also did not find any stress reductions due to the Stress Lessons, unlike the study of Kiselica and colleagues (1994). A reduction in stress might possibly be yet to come at a later moment, due to sleeper effects. Indeed, a meta-analysis by van Loon and colleagues (2020) demonstrated that follow-up assessments showed larger reductions in stress than the assessment at post-test. According to Spence and Shortt (2007), effects of the program might become visible only after adolescents experience challenging situations and then they apply the knowledge and skills learned during the program. Future studies could examine adolescents' stress in a follow-up assessment. Another reason may be that greater awareness of stress (due to the Stress Lessons) may result in somewhat elevated self-reported stress levels for some adolescents, while in others this would lead to reduced stress levels. These differential effects may cancel each other out, leading to a null effect.

Limitations

This study has some limitations. The Stress Lessons were given by trained university students and PhD candidates but also by class mentors. In future research, it is advised to make consistent use of educators (i.e., only class mentors or trained university students / PhD candidates) and efforts to guarantee program fidelity to improve reliability and ensure equal quality. Another limitation is that we did not include a questionnaire regarding self-awareness. In the study of Skre and colleagues (2013), the authors found that adolescents were better able to recognize symptoms of mental disorders after a school program for mental health literacy. When adolescents are better able to recognize symptoms, they might be more likely to endorse symptoms on questionnaires. By adding a self-awareness questionnaire, we could have examined whether self-awareness increased due to the Stress Lessons. Moreover, this study does not allow for conclusions on differences between unique ethnic backgrounds. Future research should aim to include a sufficiently large

sample to obtain meaningful subsamples of varied ethnic backgrounds to be able to conduct subgroup analyses.

Implications and Conclusion

Based on the current study and previous research, schools may incorporate a psychoeducation program about mental health, such as the Stress Lessons, in their curriculum in order for adolescents to increase their understanding of stress. The Stress Lessons were found to be effective in terms of gained knowledge for boys, girls, vocational and academic education, Dutch, non-Dutch, and mixed ethnic background. The Stress Lessons seem to be most effective for girls and for adolescents who follow academic education. To improve the effectiveness for boys and vocational education students, the effect of the Stress Lessons might be improved by spreading the content over 4 or 5 sessions and/or include more game-based learning (de Witte & Haan, 2013; Driessen & van Langen, 2013; Schmitz et al., 2015). Schools should be aware that the goal of the Stress Lessons is for adolescents to gain more knowledge about stress and to become more aware of different ways in which stress can be experienced and not necessarily to reduce stress levels.

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Declarations

Competing Interests and Funding The authors declare no conflict of interest.

Ethics Approval The design of this study was approved by the university's Psychology Ethical Committee (CEP18-0911/336).

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