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School-Related Pressure in Adolescents and its Relationship with Stress: The Moderating Role of Resilience and Optimism Laura ten Lande 6568017 Supervisor: W. A. van der Schuur Second Assessor: T. ter Bogt Youth Studies University of Utrecht June 2020

Abstract

A significant increase in school-related pressure among adolescents was found within multiple countries. This is concerning because school-related pressure may lead to stress and negatively affect health and school outcomes. The aim of this study was to investigate the relationship between school-related pressure and mental health, and if this relationship is mediated by stress. In addition, it was tested whether optimism and resilience moderated the relationship between school-related pressure and stress. The used data was a subsample (n = 6009, $M_{age} = 14.10$ $SD_{age} = 1.64$, 51.4% boys) from the Peilstation research from the Trimbos Institute (2019), which is conducted every four year among 10- to 18-year-old adolescents. Findings showed that school-related pressure was negatively related to mental health, and that this relationship was partly mediated by stress. Optimism and resilience were found to be significant moderators, and weakened the relationship between school-related pressure and stress. This indicates that optimism and resilience should be considered as protective factors against stress caused by school-related pressure and thus against mental health problems.

Keywords : school-related pressure, stress, mental health, adolescents, optimism, resilience

Samenvatting

In meerdere landen is onder adolescenten een significante stijging gevonden in schooldruk. Dit is zorgelijk omdat schooldruk kan leiden tot stress en een negatief effect kan hebben op de gezondheid en schoolresultaten. Het doel van dit onderzoek was het onderzoeken van de relatie tussen schooldruk en mentale gezondheid en of stress deze relatie medieert. Ook is onderzocht of de relatie tussen schooldruk en stress wordt gemodereerd door optimisme en veerkracht. De data was onderdeel (n = 6009, $M_{age} = 14.10$, $SD_{age} = 1.64$, 51.4% boys) van het Peilstationonderzoek van het Trimbos-Instituut dat elke vier jaar wordt uitgevoerd onder 10- tot 18-jarige scholieren. De resultaten lieten zien dat schooldruk negatief was geassocieerd met mentale gezondheid en dat deze relatie deels werd gemedieerd door stress. Optimisme en veerkracht bleken significante moderatoren te zijn en verzwakten de relatie tussen schooldruk en stress. Dit suggereert dat optimisme en veerkracht beschermende factoren zouden zijn tegen stress, veroorzaakt door schooldruk en dus tegen mentale problemen.

Kernwoorden: schooldruk, stress, mentale gezondheid, adolescenten, optimisme, veerkracht

School-Related Pressure in Adolescents and its Relationship with Stress: The Moderating Role of Resilience and Optimism

Today, high school students seem to experience more school-related pressure and stress then they did before. A significant increase in experiencing pressure from schoolwork among high school students in the Netherlands was found between 2001 and 2005, 2009 and 2013 and 2013 and 2017 (Stevens et al., 2018). Between 2013 and 2017 an increase of 28% to 35% was found in the group who experienced much school-related pressure. In the used literature both the terms school-related demands and school-related pressure are being used. In this paper school-related pressure is used and refers to both the school-related pressure adolescents might experience from, for example, feeling pressured by the schoolwork they have to do (Currie et al., 2012) and school-related demands, such as having much homework (Östberg, Plenty, Låftman, Modin, & Lindfors, 2018).

Feeling pressured by schoolwork may negatively affect adolescents mental health outcomes (Currie et al., 2012). According to Östberg et al. (2018), school-related pressure is identified by numerous studies as an important stimulator of stress during adolescence. Stress is usually defined as the feeling which occurs when experiencing an imbalance between perceived demands and personal recourses for coping with these demands (Giota & Gustafsson, 2016). Responses to stressors vary, because of individual differences in interpretation and coping strategies (Östberg et al., 2018). Stress in turn may lead to other mental health problems. Mental health is defined by the World Health Organization (2018) as "a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community." One example of stress leading to mental health problems is that perceived stress can be a strong risk factor for suicidal ideation, making a suicidal plan and actual suicide attempt (Chen & Kuo, 2018). Also, school-related stress might lead to anxiety (Guo, Tian & Huebner, 2018) and is related to depressive symptoms and lower life-satisfaction (Moksnes, Løhre, Lillefjell, Byrne, & Haugan, 2016).

Although, internationally seen, the Netherlands belong to the 40% with the lowest scores of perceived school pressure (Currie et al., 2012), these scores are significantly increasing. Preventing these scores from further increasing might prevent adolescents from mental health problems caused by school-related pressure. In the current study, the protective role of optimism and resilience is examined.

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The aim of this study is to examine (1) the relationship between school-related pressure and mental health, (2) the mediating role of stress, and (3) the moderating role of optimism and resilience.

The Relationship between School-Related Pressure, Stress and Mental Health

Overall, the literature showed support for the relationships between school-related pressure, stress and mental health. Östberg et al. (2018) examined the cross-sectional relationship between task-related school pressure and general stress among adolescents in Sweden. Higher task-related school pressure was significantly associated with greater perceived stress. In addition, Giota and Gustafsson (2017) examined the association between school-related pressure, school-related stress, and mental health problems in a longitudinal study with two waves. Findings showed that high school-related pressure was related to high levels of school-related stress in grade 6. Also, school-related stress in grade 6 was highly related to psychosomatic and emotional distress factors. At last, the perceived increase in school-related pressure and school-related stress between grade 6 and grade 9 was weakly related to psychosomatic and emotional distress factors.

Torsheim and Wold (2001) suggest that when adolescents consistently experience too high school-related pressure, this results in school-related stress, which might result in somatic complaints. The Transactional theory of stress (Lazarus, 1991) might help explain the relationship between school-related pressure and stress. This theory suggests that an individuals' reaction to stress depends of whether the individual perceives the stressor as a personal threat, the controllability of the stressor and his/her coping abilities (Lazarus & Folkman, 1984; Lazarus, 1991). In line with this theory, it is plausible that whenever an individual perceives his/her school situation as too overwhelming and he/she does not feel in control or at ease with this situation, stressful feelings arise.

One explanation for stress leading to worse mental health is that stress activates cortisol, which is an important stress hormone (Harris, Ursina, Murisond, & Eriksen, 2007). The activation of this hormone can be useful in the short term, because it protects the body and promotes adaptation. When cortisol levels do not drop to their regular level, this might lead to illness. High cortisol levels have been related to depressive symptoms and burn-out (Harris et al., 2007). In addition, a prolonged presence of stress can effect an individual's psychological state and thus effect mental health (Ursin & Eriksen, 2003).

The Moderating Role of Resilience and Optimism

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In line with Lazarus's Transactional theory (Lazarus, 1991), personal resources might form a buffer against developing school-related stress (Kimura et al., 2018) as a result of school-related pressure. There are two moderating factors that may reduce adolescents' stress caused by school-related pressure, that is resilience and optimism.

As for resilience, research focuses on different concepts (Panter-Brick & Leckman, 2013). Resilience refers to the capacity to adapt to challenging situations through the interaction between risk and protective factors (Matel-Anderson, Bekhet, & Garnier-Villarreal, 2018). Also different operationalisations have been used to measure the concept of resilience, such as confidence, self-control, empathy, optimism, social support and sense of humour (Earvolino-Ramirez, 2007; Moreno-Maldonado, Jiménez-Iglesias, Rivera, & Moreno, 2019; Philips, King, Michaelson, & Pickett, 2018). No studies on resilience being a protective factor against stress caused by school-related pressure were found. However, based on the results of Chen and Kuo (2018) resilience may be a protective factor against mental health issues when faced with stressors, possibly from school-related pressure. Specifically, Chen and Kuo (2018) tested whether there would be a relationship between perceived stress, resilience, and suicidal behaviors. Resilience was significantly and negatively correlated to suicidal behaviors. In addition, Chen and Kuo (2018) found that adolescents with a higher level of perceived stress have a lower risk for suicidal ideation and suicidal plan at baseline if they are hopeful and optimistic. Although the generalizability of this research must be considered, since it is conducted in Taiwan, the findings do indicate that resilience may be a personal resource that help adolescents to cope with school-related stress.

Optimism is described as a stable individual characteristic in which people expect good things to happen to them in the future (Tetzner & Becker, 2018). Although again no studies on optimism being a protective factor against stress caused by school-related pressure were found, optimism may lead to lower levels of distress, better relationships, and well-being (Tetzner & Becker, 2018). Optimists focus more towards positive stimuli than negative stimuli and take active steps towards preferred future outcomes and emotional states (Tetzner & Becker, 2018). In the study from Chen & Kuo (2018) optimism seemed to work as a protective factor against mental health issues caused by stress. Taken together, optimism might work as a protective factor against stress caused by school-related pressure as well.

The Present Study

Little research is done on the relationships between school-related pressure, stress and mental health, and no studies have examined the moderating role of resilience and optimism.

As a result, the current study aims answer the following research questions: (1) To what extent is there a relationship between school-related pressure and mental health among Dutch adolescents?, (2) to what extent is the relationship between school-related pressure and mental health mediated by stress?, and (3) to what extent is the relationship between school-related pressure and stress moderated by resilience and optimism?

It was hypothesized that school-related pressure is negatively related to mental health among adolescents (H1). Meaning that adolescents who report higher levels of school-related pressure, report lower levels of their mental health. It was also hypothesized that schoolrelated pressure is negatively related to mental health among adolescents through stress (H2). This means that adolescents who report higher levels of school-related pressure will report higher levels of stress (H2a), which in turn is related to lower levels of their mental health (H2b). Finally, it was hypothesized that optimism (H3) and resilience (H4) negatively moderate the relationship between school-related pressure and stress, meaning that when adolescents experience school-related pressure, but they are resilient or optimistic, the negative consequences on mental health disappear or reduce (see Figure 1).



Figure 1. Research model

Method

Design and Sample

This study is part of the Happiness Under Pressure project executed by the Peilstation research. Data was collected among students from the final two classes from primary schools (grade 5 and grade 6) and from students from secondary schools (grade 7 to grade 12). Since

this study focuses on adolescents, only students from the secondary schools were included. Inclusion criteria were: All secondary schools were qualified if they offered regular education for the levels Pre-vocational secondary education, Senior general secondary education and Pre-university education, if they had an independent management and if, from at least one of the school levels, four years of that level was available.

In total, 110 secondary schools participated the study. Within the secondary schools 289 classes are studied. 6186 high school students participated. Of these cases, 68 questionnaires were deleted by the research coordinators, because of too many missing items or doubts about the truthfulness of the participants. This was for example the case when students only filled out the most extreme score for all items, which is unlikely to be true. Therefore, 6118 questionnaires remained for analyses.

The cases (n = 109) with missing values on the relevant variables were excluded from the analyses. A t-test was conducted to compare the group with missing data with the group without missing data on different variables. The differences for gender (p = .068) and country of birth (p = .083) were not significant. The differences for age (p = < .000) and the differences for school level (p = < .000) were significant. The group without missing data was older (M = 14.10, SD = 1.64) than the group with missing data (M = 13.45, SD = 1.43) and the group without missing data participated in higher school levels (M = 2.66, SD = 1.10) than the group with missing data (M = 1.88, SD = 1.10) did. In the final sample, 6009 participants remained ($M_{age} = 14.10$, $SD_{age} = 1.64$, 51.4% boy). Countries of origin were: the Netherlands (94.2%), Suriname (0.2%), (former) Netherlands Antilles or Aruba (0.4%), Morocco (0.4%), Turkey (0.3%), Germany (0.3%), other western countries (2.3%) and other non-western countries (1.8%).

Procedure

The data collection took place from April to September 2019. The schools were randomly assigned by means of information from the Dutch education implementation service (DUO). School were stratified by municipal health services. After the ethical review committee of the Trimbos Institute gave permission, the schools were invited by the regional GGD or the Trimbos Institute by post and e-mail. The schools could indicate if they wanted to participate or not by an appliance paper (online or by paper). With no respond after two weeks, the school was called to ask again whether they wanted to participate or not. Passive informed consent was used for the parents. Parents were informed about the research by an information leaflet. They were directed to the Peilstation research website for the privacy protocol. If parents were against the participation of their child, they could communicate this to the school.

The questionnaires were completed in October and November 2019 under the guidance of a trained research assistant of the Trimbos Institute. Dependent from the size of the school, 2 or 3 classes were randomly selected. Classes that included less than 10 students and classes with only "learning support education" were excluded. Students were informed verbally and in writing by the research assistant about the research prior to the data collection. When students did not want to participate they were asked to work on their schoolwork. Regarding the privacy: Students got online access to the questionnaire by a code, which could not be linked to their names. Data was safely stored on the network disk from the Trimbos Institute.

Measuring instruments

School-related pressure. School-related pressure was measured with one item: "How much are you feeling pressured by schoolwork?" This item was measured on a 4 point Likert Scale: 1 = "*Not at all*", 2 = "*A little*", 3 = "*Quite much*" and 4 = "*A lot*" (M = 2.28, SD = 0.81). Higher levels indicate more school-related pressure.

Stress. Stress was measured with six items about different sources of stress: "I feel stressed because of... school or homework, my side job, my situation at home (such as worries, problems or fights), my own problems (such as my health, fights with others, love/relationship, secrets or debts), what others might think of me, social media (having to post fun things, comparing myself with others, fear of missing out), I am so busy (for example with school, homework, social media, side job, sports, etc.). These items were measured on a 5 point Likert Scale: 1 = "Never", 2 = "Once in a while", 3 = "Sometimes", 4 = "Often", 5 = "Always". A Principal component analysis (PCA) and a reliability analysis were performed. The PCA extracted two factors. The first factor included four items (including: stress from situation at home, stress from own problems, stress from social media and stress from opinions from others), with factor loadings between 0.67 and .77 (Chronbach's Alpha = .74). The second factor included three items (including: stress from homework, stress from side job and stress from busyness), with factor loadings between .665 and .683 (Chronbach's Alpha = .40). Since this study was interested in general stress and the second factor showed low reliability, one variable was created, including all 6 items (M = 2.12, SD = 0.72, Chronbach's Alpha = .684). Higher levels indicate more stress in general (i.e., more stress within different life domains). This is different from how the used articles measure stress (Östberg et al.,

2018; Chen & Kuo, 2018), which is more based on stressful feelings in general (e.g., 'I never feel really free').

Mental health. Mental health was measured by 13 items about positive health (eg., 'Do you believe life is meaningful?'). The items were measured on a 3 point Likert Scale: 1 ="*No*", 2 = "*A little*" and 3 = "*Yes*". Item three ("Do you worry about the future") had to be reversed in order to fit within the scale. PCA extracted two factors. The first factor included 10 items, with factor loadings between .550 and .886 and was more based on mental health (Rivera-Riquelme et al., 2019) than the second factor. The second factor included three items, with factor loadings between .572 and .682 and was more based on optimism (Gavrilov-Jerkovic et al., 2014). One scale was created, based on the first factor, for mental health (*M* = 2.71, *SD* = 0.43, Cronbach's alpha = .93).

Resilience. Resilience was measured in two ways. First, by using the item: "Usually I recover quickly after a difficult period" (Matel-Anderson et al., 2018). This item was measured on a 5 point Likert Scale: 1 = "Don't agree at all", 2 = "Don't agree", 3 = "Don't agree/don't disagree", 4 = "Agree" and 5 = "Totally agree". This variable is called "Resilience1" within this study (M = 3.56, SD = 1.06). Higher levels indicate higher resilience. Second, a scale was created, which was roughly based on a concept analyses on resilience (Earvolino-Ramirez, 2007). The defining attributes according to this concept analyses and the best fitting items are shown in Table 1. In total, seven items were selected (e.g., "My friends are supporting"). The items were averaged into one mean (M = 2.55, SD = 0.39, Cronbach's alpha = .73), which is called "Resilience2" within this study. A higher level indicates higher resilience.

Table 1

Creating a scale for Resilience2 (Earvolino-Ramirez, 2007).

Defining attributes	Item from Peilstation research			
Rebounding/reintegration	No matching item was found			
High expectancy/self-determination	"I have lots of confidence"			
Positive relationships/social support	"I have someone to talk to when I'm having a hard			
	time", "My friends are supporting", "My family is			
	supporting"			
Flexibility (easy temperament)	"I feel nervous in new situations. I easily lose			
	confidence"			
Sense of humor	No matching item was found			
Self-esteem/self-efficacy	"I compare myself to others to value myself",			
	"Are you happy with who you are?"			

Optimism. Optimism was measured with one item: "Do you worry about the future?" (Gavrilov-Jerkovic et al., 2014). This question was reversed and measured on a 3 point Likert Scale: 1 = "Yes", $2 = "A \ little"$ and $3 = "No" \ (M = 2.24, SD = 0.77)$. A higher level indicates more optimism.

Covariates. The control variables that were included in this study were sex and age. Sex was measured with: 1 being "Boy" and 2 being "Girl" and age was measured based on date of birth.

Data Analyses

Univariate outliers were found and investigated by using Boxplots. Some extreme cases were found. Multicollinearity was checked by VIF scores. VIF = 1.52 for Stress, VIF = 1.17 for Optimism, VIF = 1.13 for Resilience and VIF = 1.33 for School-related pressure. Linearity, homoscedasticity of Residuals and Normality are checked by Normal Q-Q Plots and Histograms. The variables were not normally distributed, but because of the large sample the variables could still be used (Field, 2013).

To test the relationship between school-related pressure and mental health (H1) a Regression analyses using SPSS was applied. To test whether or not the relation between school-related pressure and mental health was mediated by stress (H2), the Baron and Kenny (1986) method was applied. To test whether or not resilience (H3) and optimism (H4) moderated the relationship between school-related pressure and stress an interaction effect was included to the model. An alpha level of .05 was used for all the analyses.

Results

Descriptive Statistics

When asked whether students experienced pressure from schoolwork, 13.9% answered with "not at all", 52.8% answered with "a little", 24.6% answered with "quite much" and 8.6% answered with "a lot". An independent samples t-tests showed that girls experienced significantly more school-related pressure (M = 2.39, SD = .81, n = 2920) than boys did (M = 2.17, SD = .80, n = 3086), t(5975.90) = -10.62, p < .001, 95% CI [-.26, -.18].

In general, 19.9% of the students "Never" experienced stress, 49% of the students experienced stress "Once in a while", 46.5% of the students experienced stress "Sometimes", 53.3% of the students experienced stress "Often" and 46.7% of the students experienced stress "Always". An independent samples t-tests showed that girls experienced significantly more stress (M = 2.42, SD = 0.72, n = 2920) than boys did (M = 1.94, SD = 0.64, n = 3086), t(5835.03) = -27.03, p < 001, 95% CI [-.51, -.44].

When the mental health scale was divided into three subcategories, 2.5% of the students seemed to experience low mental health, 18.3% seemed to experience average mental health and 81.7% seemed to experience good mental health. In addition, an independent samples t-tests showed that boys experienced better mental health (M = 2.75, SD = 0.42, N = 3086) than girls did (M = 2.66, SD = 0.44, n = 2920), t(5936.91) = 8.26, p < .001, 95% CI [.07, .11]. Bivariate Pearson's correlation coefficients were calculated for all the relevant variables (see Table 2).

Table 2

Variables		1	2	3	4	5	6	7	8
1.	School- related pressure	-							
2.	Stress	.486**	-						
3.	Mental health	264**	430**	-					
4.	Optimism	262**	363**	.270**	-				
5.	Resilience1	192**	332**	.426**	.187**	-			
6.	Resilience2	273**	482**	.666**	.323**	.426**	-		
7.	Age	.211**	.076**	071**	165**	.019	064**	-	
8.	Gender	.136**	.330**	106**	107**	206**	195**	020	-
	Mean	2.28	2.18	2.71	2.24	3.56	2.54	14.10	1.49
	SD	.81	.72	.43	.77	1.06	.39	1.64	.50

Correlations and Descriptive Statistics of all used variables (N = 6009)

Note. ** *p* < 0.01 (2-tailed)

The Relationship between School-Related Pressure and Mental Health

To test the first hypothesis, the relationship between school-related pressure and mental health was examined. The relationship between school-related pressure and mental health was significant: $\beta = -.25$, t(6005) = -19.44, p = < .000, 95% CI [-.15, -.12]. R Square = .08. The effect size of this relationship is moderate. The results indicate that adolescents who reported higher levels of school-related pressure, reported lower levels of their mental health. This is in line with hypothesis 1.

The Mediating Role of General Stress

A mediation analyses was performed (Baron & Kenny, 1986) to test whether the relationship between school-related pressure and mental health was mediated by stress (Figure 2). The relationship between school-related pressure and general stress was significant: $\beta = .45$, t(6005) = 40.77, p = < .001, 95% CI [.39, .43]. R Square = .31. The effect size of this relationship is moderate. The results indicate that adolescents who report higher levels of school-related pressure, also report higher levels of stress. This is in line with hypothesis 2a. The relationship between general stress and mental health, with school-related pressure being a control variable, was significant: $\beta = ..41$, t(6004) = .29.38, p < .001, 95% CI [..26, ..23]. R Square = .19. The effect size of this relationship is also moderate. This means that adolescents who reported higher levels on general stress, reported lower levels on their mental health. This is in line with hypothesis 2b.

The independent variable school-related pressure was still a significant predictor for mental health after controlling for the mediator stress, but the effect was smaller: $\beta = -.06$, t(6004) = -4.71, p = < .001, 95% CI [-.05, -.02]. R Square = .19. The effect size of this relationship is now considered small. A Sobel test was performed (p < .001). The results indicate that the partial mediation was significant, which means that stress partly explained the relationship between school-related pressure and mental health.



Figure 2. Standardised regression coefficients for the relationship between school pressure and mental health, mediated by stress.

* p < .05, 2-tailed.

The Moderating Role of Optimism and Resilience

A moderation analyses was performed to test whether optimism (H3) and resilience (H4) have a protective effect on the relationship between school-related pressure and stress. The moderating role of optimism was significant: $\beta = -.05$, t(6001) = -4.74, p = < .001, 95% CI [-.08, -.03]. R Square = .39. The relationship is considered small. The results indicate that adolescents who reported higher levels of school-related pressure and optimism, reported lower levels of stress. This is in line with hypothesis 3.

The moderating role of Resilience1 was not significant: $\beta = -.01$, t(6001) = -1.31, p = .192, 95% CI [-.03, .01]. R Square = .39. The effect size of the relationship is small. Resilience2 was found to be a significant moderator: $\beta = -.04$, t(6003) = -3.800, p = < .001, 95% CI [-.12, -.04]. R Square = .41. The effect size is small. The results indicate that adolescents who reported higher levels of school-related pressure and Resilience2, reported lower levels of stress. This is in line with hypothesis 4.

Discussion

The aim of this study was to gain insight in (1) the possible relationship between school-related pressure and mental health, (2) the mediating role of stress, and (3) the moderating role of resilience and optimism in the relationship between school-related pressure and stress. The findings showed a relationship between school-related pressure and mental health and stress partly explained this relationship. In addition, optimism and resilience were significant moderators.

The Mediating Role of Stress

It was hypothesized that school-related pressure is negatively related to mental health among adolescents (H1), and that this relationship is mediated by stress (H2). In line with the hypothesis (H1) it was found that adolescents with higher levels of school-related pressure reported lower levels of mental health. According to the results stress partly explained the relationship between school-related pressure and stress, which is partly in line with the hypothesis (H2), which suggested full mediation. The results are in line with previous research that found relationships between school pressure, stress and mental health (Chen & Kuo, 2018; Gustafsson, 2017; Östberg et al., 2018). Although stress did not fully explain the relationship between school-related pressure and mental health, there was a big decrease in effect size for the relationship between school-related pressure and mental health, when controlling for stress. This indicates that stress is an important mediator.

The Moderating Role of Optimism and Resilience

It was also hypothesized that optimism moderates the relationship between schoolrelated pressure and stress (H3). It was found that optimism was indeed a negative significant moderator. This means that when adolescents reported higher levels of optimism the relationship between school-related pressure and stress became less strong, which in turn might result in higher levels of mental health. Overall, the results suggest that optimism may be important as a protective factor against the negative relationship between school-related pressure and stress. This is in line with a previous study where they suggested that optimism could lead to lower levels of distress and better well-being (Tetzner & Becker, 2018).

The final hypothesis suggested that resilience moderates the relationship between school-related pressure and stress (H4). Resilience was measured in two ways. First, resilience was measured by one item ("Usually I recover quickly after a difficult period") and was no significant moderator. Second, resilience was measured by combining factors that are supposed to be predictors for resilience (Earvolino-Ramirez, 2007). This variable was found to be a negative significant moderator and may have a protective function against stress caused by school-related pressure. This means that when adolescents reported higher levels of this type of resilience, the relationship between school-related pressure and stress became less strong, which in turn might result in higher levels of mental health. This is in line with the results from the study from Chen and Kuo (2018) where they found resilience to be negatively correlated to suicidal behaviors, which we consider to be an indicator for mental health. These findings confirm the complexity of the concept resilience, since two different types of measurements of resilience, created two different outcomes. One reason for this might be that researchers use different concepts (Panter-Brick & Leckman, 2013) and operationalizations (Earvolino-Ramirez, 2007; Moreno-Maldonado, Jiménez-Iglesias, Rivera, & Moreno, 2019;

Philips, King, Michaelson, & Pickett, 2018). This suggests there is no consensus yet about what resilience is exactly and how to measure it. In addition, the questionnaire was not completely based on validated scales. Because of this, there is no complete certainty about which concepts the questions measure.

Strengths and Limitations

The first strength of this study was the large sample. 6009 questionnaires were suitable for the analyses. The second strength is the recency of the data collection. Since the data is gathered in 2019, the results are reliable with regard to the current society and issues. The third strength is the representative sample, which is based on stratification of municipal health services. All these factors increase the external reliability of the study.

A limitation of this study is its cross-sectional nature, which makes it harder to make a strong case for causal relationships. Another limitation are the self-report questionnaires. Some participants might not fully understand some of the questions or lack focus which might decrease the internal reliability and validity of the study. The final limitation is the methodological nature of the questionnaire. The questionnaire is based on interviews with adolescents. On one hand can this be considered a strength since the questionnaire is based on topics which the adolescents found important. This makes the topics very relevant. On the other hand, the consequence is that the questionnaire is not completely based on validated scales, which might cause some confusion with regard to the interpretation of the items.

Conclusions and Implications

More research is needed to explain the relationship between school-related pressure, stress and mental health. Some of the investigated studies used school-related stress (Torsheim & Wold, 2001; Giota & Gustafsson, 2017) and others used general stress (Östberg et al., 2018; Chen & Kuo, 2018) as a variable. The current study measured general stress, but in a different way than the used literature did. The current study measured general stress by different, possible, stressful sources (e.g., stress from social media and stress from school), because it was interested whether school-related pressure would enhance stress in general (i.e., enhance over different life domains) and not only within the school context. For this, a not validated scale was used. A PCA extracted two factors. One factor, including all the items, was used. Because of this, it would be relevant to investigate this type of general stress and the relationship with school-related pressure through a validated scale.

Promising results were found for optimism. Optimism is described as a stable individual characteristic (Tetzner & Becker, 2018). More research is needed to investigate

whether and, in what way, optimism can be improved and how it can be used in preventive strategies. Also, promising results were found for the scale for resilience based on predictors. As described earlier, resilience can be considered the capacity to adapt to challenging situations through the interaction between risk and protective factors (Matel-Anderson, Bekhet, & Garnier-Villarreal, 2018). The combined predictors for resilience seem to work as a protective factor against stress caused by school-related pressure. These variables thus might be useful for preventive strategies. More research is needed to investigate what the role of these variables are separately and what their effect is when combined in other relationships. Also, because of the contradicting results regarding resilience, more research is needed about this concept in general. It would be relevant to investigate this concept and its relations with school-related pressure and stress through a validated scale.

Overall, several variables seem to be promising for the use of preventive strategies regarding school-related pressure, stress and mental health. It is clear that more research is needed to understand the investigated variables and mechanisms, because it is only when we have the complete picture, that we can benefit fully from them and prevent our adolescents from some possible harm.

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Appendix 1: Interdisciplinary approach

This interdisciplinary approach is based on the ecological model of Bronfenbrenner (Bronfenbrenner, 1979).

School-related pressure, stress, resilience, optimism and mental health are all related to the **individual level** since they all say something about the individuals' feelings or personal characteristics. Resilience is about the interaction between risk and protective factors that sustains the individuals' stability when experiencing adversity (Matel-Anderson, Bekhet, & Garnier-Villarreal, 2018). Those risk and protective factors are connected to both personal and external factors. Close friend, which belong in exosystem, might for example be a protective factor. So, investigating which variables are part of resilience, is an interdisciplinary matter.

The **microsystem** can influence individuals' feelings. It was found, for example, that school demands may lead to stress (Östberg ,Plenty, Låftman, Modin, & Lindfors, 2018). So, while stress is experienced by an individual, it might be influenced by external sources.

The **mesosystem:** Interactions between the microsystems are not taken into account within my study. The way the educational system is designed might influence the amount of pressure students experience. This is related to the **exosystem**. The educational system is not investigated within my study.

The **macrosystem** influences individuals by overarching values and beliefs. This might influence individuals when, for example, academic achievement is highly valued. Values within the macrosystem are not investigated within my study.

The **chronosystem** influences individuals by environmental events and changes over time. A big increase in stressed students in Sweden and Finland was found between 1994 and 2010 (Giota & Gustafsson, 2016), but the cause for this is not investigated within my study.

Finally, regarding the interdisciplinarity of my study, the individual level and the microsystem will be taken into account. Within these levels multiple disciplines are being used. For example, for stress a psychological perspective (the Transactional theory; Lazarus, 1991) and biological perspective (regarding cortisol; Harris et al., 2007) will be used.

Investigating other influences would be very interesting, but then the study would become too complex. Also, influences outside the individual level and microsystem are not measured within the Happiness Under Pressure dataset.

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Appendix 2: Contract data use TED

2: Contract data use (TED)

Utrecht, 2019

This letter constitutes formal confirmation of the fact that the data from the Utrecht University of Youth Studies 2020 have been made available to Laura ten Lande of Utrecht University.

These data will not be made available to others, and the data may be used only for analysis and reporting on topics for the thesis, about which agreement has been reached with Dr Regina van den Eijnden.

Laura ten Lande will receive access to the data from the dataset in order to answer the following research questions within the framework of the thesis:

Research question: To what extent is there a relationship between performance pressure and mental health among Dutch adolescents? To what extent is the relationship between performance pressure and mental health moderated by resilience and optimism?

The following variables will be used:

The dependent variable of this research is mental health, the independent variables are perceived performance pressure, perceived stress, resilience and optimism.

Mental health will be measured by question 12 and question 85. Perceived performance pressure will be measured by question 14, question 15 and question 81. Stress will be measured as one general factor; question 16. Resilience as the overall factor will be measured by question 83. To test which variables could be part of the concept of resilience, self-confidence (question 84 and item 2, 4, 5 and 6 of question 82), social support (item 14, 15, 16 and 17 of question 82) and optimism (item 3, 4 and 5 of question 85) will be measured. Optimism, will also be measured as a separate factor (item 3, 4 and 5 of question 85).

No report based on the data from the project entitled Happiness Under Pressure may be made public, unless permission has been obtained in advance from the Project Coordinator for the Happiness Under Pressure.

After the expiration of this contract, dated 1-7-2020, Laura ten Lande shall delete the Happiness Under Pressure data.

Dates and signature: 28-1-2020

