

**The association between perceived social support in adolescence and positive mental health outcomes in early adulthood: A prospective cohort study**

Jakobsen, Andreas Lindegaard; Hansen, Claus D.; Andersen, Johan Hviid

*Published in:*  
Scandinavian Journal of Public Health

*DOI (link to publication from Publisher):*  
[10.1177/1403494821993718](https://doi.org/10.1177/1403494821993718)

*Publication date:*  
2022

*Document Version*  
Accepted author manuscript, peer reviewed version

[Link to publication from Aalborg University](#)

*Citation for published version (APA):*  
Jakobsen, A. L., Hansen, C. D., & Andersen, J. H. (2022). The association between perceived social support in adolescence and positive mental health outcomes in early adulthood: A prospective cohort study. *Scandinavian Journal of Public Health*, 50(3), 404-411. <https://doi.org/10.1177/1403494821993718>

**General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

**Take down policy**

If you believe that this document breaches copyright please contact us at [vbn@aub.aau.dk](mailto:vbn@aub.aau.dk) providing details, and we will remove access to the work immediately and investigate your claim.



# **The association between perceived social support in adolescence and positive mental health outcomes in early adulthood: a prospective cohort study**

Andreas Lindegaard Jakobsen<sup>1</sup>

Claus D. Hansen<sup>1</sup>

Johan Hviid Andersen<sup>2</sup>

<sup>1</sup> Department of Sociology and Social Work, Aalborg University, Aalborg, Denmark

<sup>2</sup> Danish Ramazzini Centre, Department of Occupational Medicine, Regional Hospital West Jutland

This paper is published in:

**Scandinavian Journal of Public Health**

This manuscript accepted for publication includes our revisions after peer review, prior to any typesetting for the journal. Reuse is restricted to non-commercial and no derivative uses.

To access the publisher's version:

Jakobsen, A. L., Hansen, C. D., & Andersen, J. H. (2022). The association between perceived social support in adolescence and positive mental health outcomes in early adulthood: A prospective cohort study.

*Scandinavian Journal of Public Health*, 50(3), 404-411. <https://doi.org/10.1177/1403494821993718>

## **Corresponding author**

Andreas Lindegaard Jakobsen

Mail: [andreaslj@socsci.aau.dk](mailto:andreaslj@socsci.aau.dk)

Phone: +45 60105688

## **Abstract**

*Aims:* The link between perceived social support and mental health has received much attention from numerous scientific fields in recent years. Most studies, however, have examined associations only over relatively short follow-up periods using global measures of perceived social support and dichotomous negative indicators of mental health. We investigated the long-term association between perceived social support from friends, parents, and teachers and multiple positive hedonic and eudemonic indicators of mental health, including hope, meaningfulness, and subjective well-being. *Methods:* This study used questionnaire data from 2004, 2007 and 2010 from the West Jutland Birth Cohort study with linked register data. The study population consisted of 3681 adolescents born in 1989. Multiple linear and ordered logistic regression were used to analyse the association between perceived social support at age 14/15 and mental health indicators at age 20/21 while controlling for possible confounders, including the Big Five personality traits and baseline symptoms of depression. *Results:* The results show that perceived social support from friends in adolescence was positively associated with all indicators of mental health in early adulthood. Furthermore, perceived paternal social support was positively associated with meaningfulness and subjective well-being, while perceived social support from teachers was positively associated with meaningfulness.

***Conclusion:* Overall, the results from this study indicate that perceived social support in adolescence, particularly support from friends, could promote positive mental health outcomes in early adulthood.**

**Keywords:** Mental health, Well-being, Social support, Adolescence, Early adulthood, Prospective study, Multiple imputation.

## Introduction

Many studies have understood mental health as a dichotomy on the presence or absence of mental disorders. Thus, measuring and promoting positive concepts of mental health has rarely been the focus of health surveillance and monitoring. Recent years have witnessed a shift towards a positive and more complex understanding of mental health [1] and a larger focus on well-being rather than symptoms of illness [2]. One of the most widely used definitions of positive mental health is the WHO definition as '*A state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community*' [3]. This definition covers both hedonic and eudemonic aspects of mental health. Overall, the hedonic viewpoint primarily focuses on subjective well-being (SWB), including positive emotions and general life satisfaction. In contrast, the eudemonic aspect focuses on psychological well-being and functioning [2]. This focus on positive mental health is important because positive mental health has many beneficial consequences, such as better physical health [4], increased productivity and engagement [2, 4].

Over the last 45 years, a significant amount of research has focused on the importance of social relations as an antecedent of mental health. In particular, the concept of social support has been the focus of many studies [5]. Two general models hypothesize the possible relationship between social support and mental health: 1) *The stress-buffer model*, in which social support is related to mental health only or primarily for persons exposed to stressors, by reducing or eliminating stress responses. 2) *The direct effect model*, in which social support has positive benefits for mental health irrespective of exposure to stressors by providing positive affect, self-worth and a sense of predictability and stability [6]. Several meta-analyses and reviews have documented an association between social support and mental health for both models [7–9]. Few studies, however, focus specifically on how social support in adolescence is important for mental health in early adulthood and none of these studies focuses on positive mental health outcomes [10–13]. However, both adolescence and early adulthood can be considered critical life periods that are particularly important for forming one's identity, establishing mature friendships and making important life choices, such as choosing an education [14] and thereby making it highly relevant to study social support and mental health during these periods of life

According to recent reviews, most studies are cross-sectional or longitudinal with relatively short follow-up periods [7, 8]. For cross-sectional studies there is a large risk for reverse causation as better mental

health might lead to a perception of greater support [7]. This study aims to explore and compare the association between perceived social support from various sources in adolescence (friends, teachers, maternal, paternal) and both hedonic and eudemonic aspects of positive mental health in early adulthood, thereby examining a longer follow-up period and minimizing the risk of reverse causation.

## **Methods**

### *Design and population*

The data stem from the West Jutland Cohort Study. The birth cohort study consisted of all individuals born in 1989 living in the former county of Ringkjøbing, Denmark, in early April 2004, with a total source population of 3681 adolescents. This study includes three waves of questionnaire data (2004, 2007 and 2010) supplemented by register data from the respondents' families measured in 2003 from Statistics Denmark. The respondents were linked to their parents or guardians by using their personal identification number (CPR number). Of the 3681 individuals defining the source population, 83 % answered a questionnaire at baseline in 2004. In the follow-up waves in 2007 and 2010, the response rates were 71 % and 64 %, respectively.

### *Outcome variables*

#### *Eudemonic Mental Health – Hope*

Classical definitions of hope have been based on a one-dimensional conceptualization of hope as an individual's belief that goals can be met. Snyder et al. [15] argue that there exists two basic and interdependent cognitive elements of hope, and in that context, they define overall hope as 'a cognitive set that is based on a reciprocally derived sense of successful (a) agency (goal-directed determination) and (b) pathways (planning of ways to meet goals)' [15]. In this study, hope was measured using the Total Hope Scale, which combines the agency and pathway subscales. The scale has shown good reliability and validity in previous studies [15, 16].

The original scale contains four distractor items, however these items were not included in the questionnaires. The scale contains eight items e.g. 'I energetically pursue my goals.' for the agency aspect

and e.g. 'I can think of many ways to get out of a jam' for the pathway aspect. The scale ranges from 9-64, with higher scores indicating higher levels of hope ( $\alpha=0.86$ ).

#### *Eudemonic Mental Health – Meaningfulness*

Meaningfulness is part of Aaron Antonovsky's concept of sense of coherence. Antonovsky states that the most important part of this concept is meaningfulness, defined as '*a belief that things in life are interesting and a source of satisfaction, that things are really worth it and that there is good reason or purpose to care about what happens in life*' [17]. In this study, meaningfulness was measured using the four-item subscale for meaningfulness from Wold and Torsheim's version for children of Antonovsky's 13-item SOC scale [18]. E.g 'What do you think of the things you do every day?' and 'How often do you do things that you find meaningful?'. This version has not been validated in previous studies, but the adult version has shown to be a reliable, valid and cross culturally applicable instrument [19]. The final scale ranges from 4 to 20, with higher scores indicating higher levels of meaningfulness ( $\alpha=0.73$ ).

#### *Hedonic Mental Health – Subjective Well-being*

Positive emotions toward one's life is a typical example of a hedonically oriented measure of subjective well-being [2]. The specific measure for SWB in this study is based on Andrews and Withey's 'Delighted-Terrible Scale,' where respondents must evaluate their life in general based on the single question 'How do you feel about your life as a whole?' with seven response options ranging from delighted (7) to terrible (1) [20].

#### *Exposure variables*

##### *Perceived social support*

As previously mentioned, this study focuses on perceived (emotional) support.

Emotional support, often referred to as the most important form of social support, can be defined as 'the availability of one or more persons who can listen sympathetically when an individual is having problems and can provide indications of caring and acceptance' [21].

##### *Perceived social support from friends*

In this study, we used the Perceived Emotional/Personal Support Scale, designed to measure perceived social support among young people aged 14-19 [22].

Our scale was based on two of the original four items: 1) 'Do you talk to friends about your personal concerns when you need it?' and 2) 'Are you satisfied with the help and support your friends give you?' The items were added to form an additive scale from 0-8, with high scores indicating the perception of high perceived social support from friends ( $\alpha = 0.85$ ).

#### *Maternal and paternal social support*

To measure maternal and paternal social support, a scale was formed by selected items from The Parental Bonding Instrument[23] and, more specifically, the parental care subscale. The constructed scale consists of the following two items: 'She (he) understands my problems and worries' and 'She (he) helps me feel better if I'm upset.' The following response categories were coded from 4 to 1: (very like, moderately like, moderately unlike, very unlike). The items were added to form two additive scales from 2 to 8, with high scores indicating the perception of high perceived maternal ( $\alpha=0.80$ ) and paternal social support ( $\alpha=0.82$ ).

#### *Perceived social support from teachers*

Perceived social support from teachers was measured with items from the OECD's Program for International Student Assessment [24]. The scale consists of two items with four answer options coded from 4-1: 'Strongly agree', 'agree', 'disagree', and strongly disagree. '1) 'My teachers help me if I need extra help' and 2) 'Most of my teachers really listen to what I say.' The items were added to form an additive scale from 2 to 8, with high scores indicating the perception of high perceived social support from one's teachers ( $\alpha=0.74$ ).

#### *Potential confounders*

The confounders included in this study were sociodemographic and psychosocial factors: gender and socioeconomic status in 2003; personality traits in 2007; and symptoms of depression, negative life events and bullying in 2004.

*Socioeconomic status* was measured using the highest attained level of education and income in the respondent's household in 2003 from register data. Education was recoded into four categories: 1) < 10



years, 2) 10–12 years, 3) 13–15 years, and 4) >15 years. Income was recoded into tertiles corresponding to lowest (<61,931 EUR), middle (61,931–80,738 EUR), and highest (>80,738 EUR)

*Personality traits* were measured using the Mini-International Personality Item Pool – Five-Factor Model. [25]. Five different scales were measured: extraversion ( $\alpha = 0.78$ ), agreeableness ( $\alpha = 0.61$ ), conscientiousness ( $\alpha = 0.76$ ), neuroticism ( $\alpha = 0.72$ ), and intellect/imagination (or openness) ( $\alpha = 0.68$ ).

*Symptoms of depression* were measured using the four-item validated version of the Center for Epidemiologic Studies Depression Scale for Children [23] ( $\alpha = 0.63$ ). Symptoms of depression were chosen as a general baseline indicator of mental health to minimize the risk of reverse causality, since the outcome variables were not measured in 2004 and therefore could not be used.

*Negative life events* were measured by 6 items taken from Newcomb, Huba, & Bentler's [26] measure and the Social Stress Indicator [27]. The response options were yes or no and were summarized to yield an overall index score.

*Bullying* was measured with the question 'How much have you been bullied at school during the last 6 months?' with the response categories never, once or twice, a few times, once a week' and 'several times a week.' In the analysis, this variable was recoded to 'has ever been bullied' and 'has not been bullied at all.'

#### *Methods for handling missing data*

To avoid biased estimates and inferences due to missing data, two distinct techniques were used. First probability weights were designed to adjust for unit non-response for the initial participation in the 2004 round, as females and adolescents from families with a high income and education were slightly over-represented. The weights were designed using ranking as a method and based on the population distribution for three register variables: gender, household income and the highest household educational level. Second, multiple imputation was used for item non-response for the outcome variables from the 2010 round and for personality traits from the 2007 round.

Meaningfulness and a scale for self-esteem from the 2004 round were included as auxiliary variables for imputing the missing values for the outcome variables. Furthermore, these and the remaining variables were, as a standard, imputed using all variables used in the analyses.

The variables were imputed using the multiple imputations with chained equations (MICE) method. We chose 40 imputations based on the general rule that the number should be at least as large as the percentage

of missing data. The imputed values closely matched the observed values regarding means, standard deviations, skewness and kurtosis for all 40 imputations.

Respondents were included in the final samples for analysis if they had information on all confounding variables and the outcome variables of interest or if it were possible to impute their values on the outcome variables and the confounding variable for the personality traits. This resulted in final samples of N=2.669-2.671.

### *Statistical methods*

The descriptive statistics in table 1 were calculated for the total sample before conducting multiple imputations and without weighting. Since the predictor and outcome variables were not measured in all three waves of data we were not able to show any trends over time.

We used multiple linear regression to analyse the association between perceived social support in adolescence (T1 – 2004) and mental health in early adulthood (T2 – 2010) for the outcome measures, hope and meaningfulness. For the SWB indicator, we used multiple ordered logistic regression. For all models we performed a variance inflation factor test showing no signs of multicollinearity. For the linear models we tested for linearity, homoscedasticity and normally distributed residuals. Due to heteroscedasticity, we used robust standard errors. For the logistic models, we tested for the proportional odds assumptions.

We tested for interaction effects between gender and all types of social support for all models before conducting multiple imputation, but we found no statistically significant interaction effects. Therefore, these interactions were not included in the imputation process or the final models.

All models were estimated as crude (model 1) and with all confounders included (model 2). P-values <0.05 were considered statistically significant. STATA (version 14-16; Stata, College Station, TX, USA) was used for all analyses.

## Results

Descriptive statistics for all variables are shown in table 1. Females reported a 31% higher social support from friends than males on our scale from 0-8. No major gender differences was observed for the mental health outcomes or paternal, maternal or teacher social support.

**Table 1:** Descriptive statistics for all variables

	Age <sup>a</sup>	All		Females		Males	
		n	Mean (SD) / %	n	Mean (SD) / %	n	Mean (SD) / %
<u>Hope</u>	20/21	1,886	49.52 (8.69)	1,045	49.15 (8.34)	841	49.97 (9.09)
<u>Meaningfulness</u>	20/21	1,870	14.44 (2.41)	1,046	14.54 (2.40)	824	14.33 (2.42)
<u>Subjective well-being</u>	20/21	1,863	6 <sup>b</sup>	1,033	6 <sup>b</sup>	830	6 <sup>b</sup>
<u>Social support – friends</u>	14/15	3,010	5.59 (2.08)	1,518	6.33 (1.86)	1,492	4.83 (2.01)
<u>Social support – paternal</u>	14/15	2,900	5.5 (1.78)	1,450	5.21 (1.80)	1,450	5.73 (1.71)
<u>Social support – maternal</u>	14/15	2,985	6.27 (1.58)	1,497	6.25 (1.64)	1,488	6.30 (1.52)
<u>Social support – teachers</u>	14/15	3,014	5.83 (1.26)	1,518	5.82 (1.26)	1,496	5.85 (1.26)
<u>Intellect/imagination</u>	17/18	2,305	14.21 (2.84)	1,242	14.10 (2.80)	1,063	14.33 (2.89)
<u>Conscientiousness</u>	17/18	2,316	12.30 (3.49)	1,243	12.67 (3.54)	1,073	11.87 (3.39)
<u>Extraversion</u>	17/18	2,354	13.76 (3.30)	1,269	13.87 (3.24)	1,085	13.63 (3.36)
<u>Agreeableness</u>	17/18	2,355	16.43 (2.15)	1,271	17.00 (1.90)	1,084	15.76 (2.25)
<u>Neuroticism</u>	17/18	2,356	10.64 (3.26)	1,270	11.66 (3.17)	1,086	9.45 (2.25)
<u>Bullied</u>	14/15	3,021	—	1,521	—	1,500	—
Has ever been bullied		766	25%	382	25%	384	26%
Has not been bullied at all		2,255	75%	1,139	75%	1,116	74%
<u>Negative life events</u>	14/15	2,993	0.59 (0.88)	1,496	0.63 (0.92)	1,497	0.54 (0.84)
<u>Symptoms of depression</u>	14/15	3000	2.22 (2.20)	1,517	2.51 (2.40)	1,483	1.94 (1.94)
<u>Household income</u>	14	3,678	—	1,775	—	1,903	—
Low income		1,226	33%	602	34%	624	33%
Middle income		1,226	33%	583	33%	643	34%
High income		1,226	33%	590	33%	636	33%
<u>Household highest education</u>	14	3,582	—	1,731	—	1,851	—
< 10 years		496	14%	244	14%	252	14%
10–12 years		1,867	52%	916	53%	951	51%
13–15 years		1,030	29%	476	28%	554	30%
>15 years		189	5%	95	5%	94	5%

<sup>a</sup>Age when the variable was collected

<sup>b</sup>Median

**Table 2:** (Multiple imputation) multiple linear regression analysis of the association between perceived social support in adolescence at T1 and hope in early adulthood at T2

	<b>Model 1</b>			<b>Model 2<sup>a</sup></b>		
	<b>Hope</b>			<b>Hope</b>		
	b	(95 % CI)	β	b	(95 % CI)	β
<i>Social support – friends</i>	0.56	(0.34; 0.77)	0.13	0.42	(0.20; 0.65)	0.10
<i>Social support – maternal</i>	0.18	(-0.18; 0.54)	0.03	0.17	(-0.17; 0.52)	0.03
<i>Social support – paternal</i>	0.63	(0.33; 0.94)	0.13	0.29	(-0.00; 0.58)	0.06
<i>Social support – teachers</i>	0.41	(0.04; 0.78)	0.06	0.29	(-0.07; 0.65)	0.04
(Adjusted) R <sup>2</sup>	0.057			(0.180)		
N	2,671			2,671		

b=regression coefficient. CI=confidence interval. β= standardized beta coefficient. <sup>a</sup>Model adjusted for gender, symptoms of depression, negative life events, bullying, Big Five personality traits, household's highest level of education and household income.

### *Eudemonic Mental Health – Hope*

The results from the multiple linear regression analysis showed a significant weak positive association between perceived social support from friends, teachers and paternal social support in adolescence and hope in early adulthood (see table 2, model 1). With the inclusion of control variables, the relationship was attenuated for paternal social support and social support from teachers. Furthermore, the effect size for perceived social support from friends decreased (see table 2, model 2)

### *Eudemonic Mental Health – Meaningfulness*

The results showed significant weak positive associations between perceived paternal social support and perceived social support from friends and teachers in adolescence and meaningfulness in young adulthood (see table 3, model 1). When the model was adjusted for control variables, these relationships remained, but the effect sizes decreased, while the standardized coefficients showed that social support from friends has the largest impact on meaningfulness (see table 3, model 2).

**Table 3:** (Multiple imputation) multiple linear regression analysis of the association between perceived social support in adolescence at T1 and meaningfulness in early adulthood at T2

	<b>Model 1</b>			<b>Model 2<sup>a</sup></b>		
	<b>Meaningfulness</b>			<b>Meaningfulness</b>		
	b	(95 % CI)	$\beta$	b	(95 % CI)	$\beta$
<i>Social support – friends</i>	0.20	(0.14; 0.27)	0,17	0.13	(0.02; 0.21)	0.11
<i>Social support – maternal</i>	0.04	(-0.06; 0.13)	0,02	0.03	(-0.07; 0.12)	0.02
<i>Social support – paternal</i>	0.19	(0.11; 0.27)	0,14	0.11	(0.03; 0.19)	0.08
<i>Social support – teachers</i>	0.17	(0.07; 0.27)	0,09	0.11	(0.02; 0.21)	0.06
(Adjusted) R <sup>2</sup>	0.076			(0.194)		
N	2,669			2,669		

b=regression coefficient. CI=confidence interval.  $\beta$ = standardized beta coefficient. <sup>a</sup>Model adjusted for gender, symptoms of depression, negative life events, bullying, Big Five personality traits, household's highest level of education and household income.

**Table 4:** (Multiple imputation) multiple ordered logistic regression analysis of the association between perceived social support in adolescence at T1 and subjective well-being in early adulthood at T2

	<b>Model 1</b>		<b>Model 2<sup>a</sup></b>	
	<b>Subjective well-being</b>		<b>Subjective well-being</b>	
	OR	(95 % CI)	OR	(95 % CI)
<i>Social support – friends</i>	1.11	(1.06; 1.17)	1.08	(1.02; 1.15)
<i>Social support – maternal</i>	1.12	(0.99; 1.15)	1.07	(0.99; 1.16)
<i>Social support – paternal</i>	1.17	(1.09; 1.24)	1.10	(1.02; 1.17)
<i>Social support – teachers</i>	1.07	(1.02; 1.21)	1.09	(0.99; 1.19)
(Adjusted) McFadden's R <sup>2</sup>	0.027		(0.085)	
N	2,671		2,671	

OR= odds ratio. CI=confidence interval. <sup>a</sup>Model adjusted for gender, symptoms of depression, negative life events, bullying, Big Five personality traits, household's highest level of education and household income.

### *Hedonic Mental Health – Subjective well-being*

For this indicator, the results showed a significant positive association between perceived social support from friends, teachers, as well as paternal social support in adolescence and the likelihood of a 'higher' level of SWB in early adulthood (table 4, model 1).

However, the relationship between social support from teachers and SWB was attenuated when adjusting for confounders, and the effect sizes from paternal social support and social support from friends were slightly reduced. The odds ratios of 1.08-1.10 indicate weak but roughly equal effect sizes for social support from friends and fathers respectively (table 4, model 2).

### **Discussion**

The results of this study add to the vast amount of existing research showing an association between social support and mental health. However, we extend this knowledge and show that the association is valid not only for negative indicators of mental health, such as depressive symptoms or perceived stress, but also for both *hedonic* and *eudemonic* aspects of positive mental health, such as hope, meaningfulness and SWB. Furthermore, we tested the association over a longer period of six years, and thereby concluding that social support potentially can have long-term effects on later mental health.

The results indicated that perceived social support from friends was most important for later positive mental health: the effect sizes were larger for the eudemonic aspects, and perceived social support from friends was positively associated with all indicators of mental health in early adulthood. This finding is in line with a recent meta-analysis concluding that social support from friends in adolescence had a greater impact on hope than support from parents [9]. In contrast, a recent review indicates that support from family is more important than friends when focusing on depression [7]. One explanation may be that friends are more important for positive mental health outcomes, while family could be more important for negative outcomes.

Our study also found that social support from both teachers and fathers was associated with positive mental health. For the latter, the association existed for meaningfulness as well as SWB, whereas for the former, it was associated only with meaningfulness. While previous studies have found an association between social support from teachers and depressive symptoms in adolescence [8], this study is the first, to our knowledge, to investigate the association between social support and meaningfulness in this period of life. Perceived maternal social support was the only type of social support not associated with mental health in early

adulthood. This result is surprising as to our knowledge only two studies have also found that the father's parental behaviour during childhood is more important than the mother's for later mental health outcomes, and with no clear theoretical explanation for this [28, 29]. More studies on this topic are warranted.

We could argue that the effect sizes and explained variance found in our study were relatively weak. However, mental health, as mentioned earlier, is a broad and complex concept, caused by a wide variety of individual and social factors. Despite the weak associations, the link between social support from various groups and positive mental health may be practically significant when taking into account the importance of mental health for many areas of life.

The study had several strengths and limitations. The study benefits from investigating the association between social support from various sources, namely, friends, parents and teachers, and several indicators of mental health that include both hedonic and eudemonic aspects, while the study included a longer follow-up period than usual. In addition, our study included several important possible confounders, e.g., adjusting for high quality register-based demographic variables as well as personality traits [5, 30]. Finally, the use of a longitudinal panel data design with weights and multiple imputation made it possible to account for bias arising due to attrition, which is commonly ignored in longitudinal panel studies.

Among the weaknesses of the study, the study could have benefitted from using highly validated measures for perceived social support from friends, teachers, maternal and paternal support. Instead, we had to use measures for social support from various sources with only limited previous validation. This may negatively affect our ability to compare the relative importance of our different social support measures.

Another weakness is that the scales for personality traits were measured at age 17/18 between the exposure and outcome variables. However, a previous study showed that aggregated measures for the five personality traits appeared relatively stable during the period from 14 to 17 years of age [31]. Therefore, the personality traits measured at age 17/18 could be a valid confounder in this study.

Finally, we should emphasize that although our study documented associations between social support and positive mental health, we are unable to ascertain to what extent these are direct causal relationships, as many other factors may influence the relationship, especially mediating factors arising between age 14/15 and age 20/21. In addition, reverse or reciprocal causation cannot be ruled out, as it was not possible to control for earlier levels of positive mental health, as data on most outcome variables were accessible only

at age 20/21. However, we controlled for baseline level of depression symptoms, and thereby accounted to some extent for initial levels of mental health.

In conclusion, this study finds that perceived social support from teachers, fathers and especially friends in adolescence can potentially benefit both eudemonic and hedonic positive mental health outcomes in early adulthood. From a policy point of view, it is thus interesting to investigate how to implement interventions aiming to increase social support from friends and teachers. There is no consensus in previous research about the most effective form of intervention and whether the arena of such intervention should be schools or perhaps voluntary organizations. Future studies are needed to further explore the importance of social support and positive mental health and examine how interventions might strengthen the support experienced by adolescents [32].

### **Funding**

This study was supported by the Danish Working Environment Research Fund (project no. 24-2013-09).

### **Conflict of interest**

The authors declare that they have no conflicts of interest.

### **Ethical consideration**

The Danish Data Protection Agency approved the study. According to Danish law, questionnaire and register-based studies do not need approval by ethical or scientific committees, nor informed consent.



## References

- [1] Huppert FA. Psychological Well-being: Evidence Regarding its Causes and Consequences. *Appl Psychol Heal Well-Being* 2009; 1: 137–164.
- [2] Keyes CLM. Promoting and protecting mental health as flourishing: Early and often throughout the lifespan. In: Keyes CLM (ed) *Mental well-being: International contributions to the study of positive mental health*. Netherlands: Springer, 2013.
- [3] Grigg M, Saxena S. Promoting mental health nursing research in low and middle income countries. *International Nursing Review* 2004; 51: 194–195.
- [4] Huppert FA, Cooper CL. *Interventions and Policies to Enhance Wellbeing*. Hoboken: Wiley, 2014.
- [5] Turner BJ, Turner JR. Social Relations, Social Integration, and Social Support. In: Aneshensel CS, Phelan JC, Bierman A (eds) *Handbook of the Sociology of Mental Health / edited by Carol S. Aneshensel, Jo C. Phelan, Alex Bierman*. Dordrecht : Springer Netherlands, 2013.
- [6] House BJ, Cohen S. Stress, Social Support, and the Buffering Hypothesis. *Psychol Bull* 1985; 98: 310–357.
- [7] Gariépy G, Honkaniemi H, Quesnel-Vallée A. Social support and protection from depression: systematic review of current findings in Western countries. *Br J Psychiatry* 2016; 209: 284.
- [8] Rueger SY, Malecki CK, Pyun Y, et al. A meta-analytic review of the association between perceived social support and depression in childhood and adolescence. *Psychol Bull* 2016; 142: 1017–1067.
- [9] Mahon NE, Yarcheski A. Parent and Friend Social Support and Adolescent Hope. *Clin Nurs Res* 2017; 26: 224–240.
- [10] Katainen S. Adolescent temperament, perceived social support, and depressive tendencies as predictors of depressive tendencies in young adulthood. *Eur J Pers* 1999; 13: 183–207.
- [11] Needham BL. Reciprocal Relationships between Symptoms of Depression and Parental Support during the Transition from Adolescence to Young Adulthood. *J Youth Adolesc* 2008; 37: 893–905.
- [12] Adam EK, Chyu L, Hoyt LT, et al. Adverse Adolescent Relationship Histories and Young Adult Health: Cumulative Effects of Loneliness, Low Parental Support, Relationship Instability, Intimate Partner Violence, and Loss. *J Adolesc Heal* 2011; 49: 278–286.
- [13] Meadows SO, Brown JS, Elder Jr. GH. Depressive Symptoms, Stress, and Support: Gendered Trajectories from Adolescence to Young Adulthood. *J Youth Adolesc* 2006; 35: 89–99.
- [14] Kapfhammer HP. Psychosocial development and problems in early adulthood: developmental psychological characterization of an important segment of the life cycle. *Fortschr Neurol Psychiatr* 1993; 61: 338.
- [15] Snyder CR, Harris C, Anderson JR, et al. The will and the ways: Development and validation of an individual-differences measure of hope. *J Pers Soc Psychol* 1991; 60: 570–585.
- [16] Bryant F, Cvigros J. *Distinguishing Hope and Optimism: Two Sides of a Coin, or Two Separate Coins?* 2004.
- [17] Antonovsky A. *Unraveling the mystery of health : How people manage stress and stay well*. San Francisco, Calif.: Jossey-Bass, 1987.
- [18] Torsheim T. Adolescent coping and health; Sense of coherence. Currie C (ed) *Heal Behav Sch Aged Child A WHO Cross-National Surv (HBSC) Res Protoc 1997-1998 Study* 1998; 79–83.
- [19] Eriksson M, Lindström B. Validity of Antonovsky's sense of coherence scale: a systematic review. *J Epidemiol Community Health* 2005; 59: 460 LP – 466.

- [20] Andrews FM, Withey SB. *Social indicators of well-being. americans perceptions of life quality*. New York: Plenum Press, 1976.
- [21] Cohen S, Brittney L, Gottlieb BH. *Social support measurement and intervention : a guide for health and social scientists / edited by Sheldon Cohen, Lynn G. Underwood, Benjamin H. Gottlieb*. Elektronis. Oxford : Oxford University Press, 2000.
- [22] Slavin LA. Validation Studies of the PEPSS, a Measure of Perceived Emotional Support for Use with Adolescents. *J Adolesc Res* 1991; 6: 316–335.
- [23] Parker G, Tupling H, Brown LB. A Parental Bonding Instrument. *Br J Med Psychol* 1979; 52: 1–10.
- [24] PISA 2012. PISA products - PISA, <http://www.oecd.org/pisa/pisaproducts/pisa2012database-downloadabledata.htm>.
- [25] Donnellan MB, Oswald FL, Baird BM, et al. The Mini-IPIP scales: Tiny-yet-effective measures of the Big Five factors of personality. *Psychol Assess* 2006; 18: 192–203.
- [26] Newcomb MD, Huba GJ, Bentler PM. A Multidimensional Assessment of Stressful Life Events among Adolescents: Derivation and Correlates. *J Health Soc Behav* 1981; 22: 400–415.
- [27] Turner RJ, Wheaton B. Checklist measurement of stressful life events. *Measuring stress: A guide for health and social scientists*. 1995; 29–58.
- [28] Huppert FA, Abbott RA, Ploubidis GB, et al. Parental practices predict psychological well-being in midlife: Life-course associations among women in the 1946 British birth cohort. *Psychol Med* 2010; 40: 1507–1518.
- [29] Stafford M, Kuh DL, Gale CR, et al. Parent–child relationships and offspring’s positive mental wellbeing from adolescence to early older age. *J Posit Psychol* 2016; 11: 326–337.
- [30] Cohen S. Social relationships and health. *Am Psychol* 2004; 59: 676–84.
- [31] Borghuis J, Denissen JJA, Oberski D, et al. Big Five personality stability, change, and codevelopment across adolescence and early adulthood. *Journal of Personality and Social Psychology* 2017; 113: 641–657.
- [32] Hogan BE, Linden W, Najarian B. Social support interventions: Do they work? *Clin Psychol Rev* 2002; 22: 381–440.