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Why does perceived social support protect against somatic symptoms: Investigating the roles of emotional self-efficacy and depressive symptoms?

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Abstract

The importance of close relationships has been confirmed for a wide range of health-related outcomes, yet the mechanisms by which social support influences physical health remains understudied. The aim of the study was to investigate the roles of emotional self-efficacy and depressive symptoms as mediators of the effect of social support on physical health, based on a regionally representative sample in Finland ($N = 3\,242$, mean age = 15.0, $sd = .41$). A conditional process analysis found that (a) perceived social support was associated with less somatic symptoms, (b) the relationship between perceived social support was partially and significantly mediated by both emotional self-efficacy and depressive symptoms, and (c) there was sign of a moderated mediation: the association between perceived social support and somatic symptoms was stronger for girls than for boys, and this association was primarily accounted for by the mediating role of depressive symptoms. The present findings contribute to the existing literature on how regulated and dysregulated emotions influence pathways between social interaction and physical health.

Keywords: perceived social support, health, somatic symptoms, emotional self-efficacy, depressive symptoms, adolescence

Introduction

There is solid evidence suggesting that social relationships affect a range of health outcomes, including mental health, physical health, health habits, and mortality risk (Berkman & Syme, 1979; Cohen, 1988, 2004; Uchino et al., 2007; Umberson & Montez, 2010). Especially, perceived close quality relationships have been found to be one the most significant indicators of healthier, happier and even longer life, rivaling in magnitude the effect sizes of well-established risk and protective factors such as cigarette smoking, alcohol consumption, obesity, hypertension Rx, clean air, flu vaccine, cardiac rehab, and exercise (Holt-Lunstad et al., 2010; Pinker, 2015).

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Yet, less is known about the mechanisms through which social relationships either promote or compromise physical health in adolescence. In this paper, we argue that mental wellbeing and emotional self-efficacy may account for at least part of the association between perceived social support and somatic symptoms. The latter occurring when psychological and emotional burdens are manifested into physical symptoms that may or may not be associated with a diagnosed medical condition (American Psychiatric Association, 2013).

Before having a closer look into the aforementioned model, we will first review the literature on the bivariate associations between social support, mental health, emotional self-efficacy, and somatic symptoms.

The effect of social support on mental health and emotion regulation

Social support plays a vital role in preserving children's and adolescents' psychosocial adjustment and wellbeing (Helsen et al., 2000). In particular, high quality close relationships have been found to shape health-affecting biological responses and behaviours (Pietromonaco & Collins, 2017), whereas dysfunctional close relationships have been associated with increased mood disorders (Pössel et al., 2018; Whisman, 2007; Zhang et al., 2015), anxiety disorders (Priest, 2013), chronic health conditions (De Vogli et al., 2007) and poor self-rated physical health (Liu & Umberson, 2008). Several studies among school-aged children have found perceived support from parents and peers to protect against the development of internalizing (e.g., anxiety, sadness, social withdrawal, and fearfulness) and externalizing symptoms (e.g., overactivity, poor impulse control, noncompliance, and aggression) after being confronted with adverse circumstances and negative life events such as divorce, victimization, abuse, or poverty (Grant, Compas, Thurm, McMahon, Gipson, & Campbell, 2006; Muris, 2010). In a study with over 13 000 middle-school students in the U.S., Buchanan and Bowen (2008) also concluded that adult and peer support is essential for adolescent psychological health (see also Raboteg-Saric & Sakic, 2014; Wiens et al., 2016). Correspondingly, a 3-year-long longitudinal study in a community sample of 771 adolescents suggested that social support from friends and family may reduce depressive symptoms in boys and girls (van Harmelen et al., 2016). It has also been proposed that perceived social connectedness allows individuals to employ more effective emotion regulation strategies (Marroquín et al., 2019).

Studies on gender effects, however, show mixed findings. Some studies suggest that the association between adverse life experiences and depressive symptoms might be stronger for boys than for girls (Sinclair et al., 2012). In contrast, a study done in Sweden by Miething and colleagues (2016) found that while friendship networks and psychological wellbeing from late adolescence to young adulthood were closely intertwined among males and females alike, females' social relationships were particularly vulnerable to changes in health status. Among young Finnish adults, Saikkonen, Vahlberg and Saarijärvi (2018) found that low social support and high levels of alexithymia, i.e., the inability to identify and describe emotions in the self, were associated with increased psychological distress in both females and males.

Emotional self-efficacy as predictor of somatic symptoms

According to Bandura (1997, 2002), emotional self-efficacy (ESE) refers to the ability to manage emotions internally, especially when there is a need to master difficult challenges. A low sense of self-efficacy has been found to be associated with depression, anxiety, and helplessness, whereas high sense of self-efficacy has been related to better health, higher achievement, and better social integration (Schwarzer, 2014; Schwarzer & Knoll, 2004). Previous studies have also demonstrated that self-efficacy beliefs predict cognitive and affective components of subjective wellbeing (Caprara et al., 2008; Muris, 2002) and pro-social behaviour (Alessandri et al., 2009; Caprara & Steca, 2005; Yap & Baharudin, 2016).

Furthermore, empirical and clinical reports suggest a solid association between the ability to regulate emotions internally and the experience of somatic symptoms (Güney et al., 2019). For instance, Yildiz and Duy (2019) found emotion regulation strategies to play a predictive role in depression among adolescents, and hence dysfunctional emotion regulation strategies were significant predictors of psychosomatic symptoms (Yildiz & Duy, 2019). It has thus been suggested that disturbances in emotion regulation contribute to the development, progression as well as treatment of somatic symptoms (Rief & Broadbent, 2007).

Depressive symptoms as predictors of somatic symptoms

In psychology, depression has been defined as a mood disorder or emotional state, which is characterized by persisting feelings of low self-worth, guilt, and a decreased ability to enjoy life (Encyclopaedia Britannica, 2020). Depression is a leading cause of disability, and it is the most common psychiatric disorder worldwide. It is also connected to disordered emotion regulation and cognitive biases and deficits in cognitive control (Joormann & Stanton, 2016).

Findings from empirical studies suggest that adolescent depressive symptoms are linked with a range of detrimental outcomes, such as intrapersonal distress, low self-efficacy, and suicidality (Muris, 2002; Stewart et al., 2002; Thapar et al., 2012), as well as other neuropsychological, behavioural, and self-perception problems (McClure et al., 1997). Depressive symptoms are also associated with school absence and lack of educational achievements, as well as with violence, substance abuse, conduct disorders, and sexual health (Finning et al., 2020; Lawrence et al., 2016; Patel et al., 2007). Depressive episodes in adolescence increase the risk of subsequent depressive episodes, and of mental health and medical problems in adulthood (Copeland et al., 2009; Johnson et al., 2009).

According to Grassi (2018), there is a mental aspect to every physical disease, and empirical studies have found that depressive symptoms predict and amplify somatic symptoms (Kapfhammer, 2006). Over the past decades, several studies have shown that depression outcomes go beyond daily functioning and quality of life and extend to the area of somatic health, including cardiovascular stroke, diabetes, obesity morbidity (Penninx et al., 2013), and decline in physical activity (Naicker et al., 2013).

The effect of social support on somatic symptoms

Somatic symptoms may be defined as medically unexplained physical symptoms without known pathology (Grassi, 2018). It could be a headache, stomach pain, sleep issues, shortness of breath, or it can be expressed in a feeling of shakiness or weakness. To the extent

that the physical symptoms are disproportionate or inconsistent with a person's medical history, the reasons for the symptoms may have their roots in psychological distress. The symptoms are real and can come and go, or they can persist and trigger major distress or/and problems in functioning. It is common that an individual with the physical symptoms spends excessive amount of time and resources overthinking, stressing out, or worrying about the symptoms and health in general. Excessive thoughts, feelings, and behaviours related to the physical symptoms are caused or triggered by strong emotions such as anxiety, trauma, grief, depression, stress, guilt, or anger (American Psychiatric Association, 2013).

Somatic symptoms are relatively common experiences for children, and they have an effect on individual's health later on in life. According to Stuart and Noyes (1999) literature review on somatic disorders in children and adults, early exposure to illness increases the likelihood that distress will be manifested somatically. In Northern Europe, there is a significant increase in adolescence with symptoms of psychosomatic problems, and a corresponding increase in those reporting functional impairment additionally (Potrebny et al., 2017; van Geelen & Hagquist, 2016). Typically, girls report more somatic symptoms than boys (Hakala et al., 2002; Kingery et al., 2007; Perquin et al., 2000). Nevertheless, boys tend to report more the dysfunctional emotion regulation strategies (Yildiz & Duy, 2019) and depression (Sinclair et al., 2012) that in turn predicts somatic symptoms.

In patient samples, studies reveal that perceived social support reduces the severity of somatic symptoms (Ali et al., 2010; Das et al., 2020; Wesley et al., 2013). A study by Abu-Kaf et al. (2019) found that somatic symptoms are affected by level of perceived social support, including availability, satisfaction, and the ability to get emotional support. Furthermore, in understanding somatic symptoms, a number of studies highlight the presence of emotion regulation disturbances, such as emotion suppression (Burns et al., 2011; Gul & Ahmad, 2014), decreased ability to up-regulate positive emotions (Zautra et al., 2001), diminished ability in emotional awareness (Waller & Scheidt, 2004; Subic-Wrana, Beutel, Knebel, Lane, & 2010), and emotion recognition (Beck et al., 2013). Similarly, Låftman and Östberg (2006) found a robust negative association between social relations with parents and peers, and psychosomatic health complaints among adolescents in Sweden. Landstedt et al. (2015) concluded that the quality of parental and peer relationships of adolescence predicts adult functional somatic health as much as 26 years later (see also Dhossche et al., 2001).

Despite the strong evidence for bivariate relationships between social support, depressive symptoms, emotion regulation, and somatic symptoms, none of the studies to our current knowledge have explicitly explored the potentially mediating role of intrapersonal factors on the effect of social support on somatic symptoms. Furthermore, no studies have been made in the Nordic countries, nor any of the studies taken contextual factors into consideration such as ethnic or language-based minorities.

Purpose of the study

The purpose of the current study was (a) to examine the relationship between perceived support from close relationships and somatic symptoms among Finnish teenagers, (b) to investigate whether and to what extent the relationship was mediated by levels of depressive symptoms and/or emotional self-efficacy, and c) to explore to what extent these

processes were dependent on gender. Based on previous research, perceived support was hypothesized to be significantly related to emotional self-efficacy, and negatively related to depressive symptoms; depressive symptoms were expected to be associated with psychosomatic symptoms, whereas both perceived social support and emotional self-efficacy were expected to be negatively related to somatic symptoms. Thus, both emotional self-efficacy and depressive symptoms were expected to mediate the negative relationship between perceived support and somatic symptoms. The analysis of the moderation effects was exploratory, as previous research has been inconclusive.

Material and methods

Sample

Survey data was collected in academic year 2016-2017 in 25 upper primary schools and 25 secondary schools in Ostrobothnia, Finland. Data was collected as part of a regional youth participation project supported by the regional development organizations, as well as by the Migration Institute, and Åbo Akademi University, and the study was conducted in accordance with the ethical guidelines of Åbo Akademi University and those of the Finnish National Board on Research Integrity (2012). School principals, executive members of schools' boards, youth workers and members of youth councils were contacted prior to the study to review the questionnaire, and parental consent was obtained for students under the age of 15. The students were informed about the purpose of the project before completing the anonymous online questionnaire in class and were allowed to skip any questions they wanted.

In total, over 3 400 students took part in the survey. A system of 21 warning flags was employed to identify and omit students that did not take the survey seriously. Thus, a respondent that claimed to be both 14 years old and to attend secondary school received one flag, as did students that used inappropriate language on open-ended questions in the survey. A single flag did not in itself exclude a respondent from the study, whereas five or more flags meant automatic omission. In cases with two to four flags, a dedicated group of undergraduate students examined the survey response patterns for further anomalies, and unless any anomalies were found, the case was reintroduced into the data. In addition, respondents that did not complete any of the background questions were omitted from the study. By the end of this process, a total of 3 242 students (1 642 girls and 1 584 boys) were eligible for the final analysis. The sample consisted of 55% middle school 9th graders (1 782 students, mean age = 15.0, $sd = .41$) and 45% secondary school 3rd graders (1 460 students, mean age = 17.8, $sd = .74$). About two-thirds (65%) of the students attended Swedish-speaking schools, whereas 35% attended Finnish-speaking schools.

Measures

In addition to items on gender, age, education level and school language, the survey included measures on perceived social support, somatic symptoms, depressive symptoms, and emotional self-efficacy.

Perceived social support was assessed by asking students to whom they would turn if they needed to talk about things that bothered them. Respondents answered "yes",

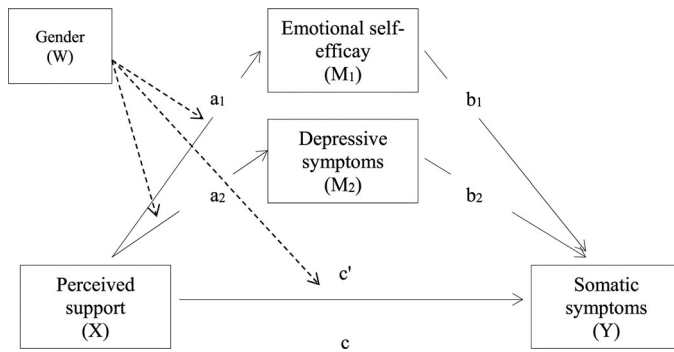


Figure 1. A conceptual model of the effect of perceived support on somatic symptoms, with emotional self-efficacy and depressive symptoms as mediators, and student gender as a moderator.

“maybe” or “no” to each item on a ready-made list of ten potential sources of support. As a proxy for perceived support, a sum-score variable was created by adding the scores for the three most common options, namely support from mother, father, and friends, so that each “yes” counted as one point, each “maybe” as half a point, and each “no” as zero points, for a total score between 0 and 3.

Somatic symptoms were measured with four items from the somatization subscale of the Brief Symptom Inventory (Derogatis, 1975). Respondents were asked to what extent, on a scale from 0 (not at all) to 4 (very much), they had been experiencing headache, stomach-ache, stress, or sleeping problems. The scale showed good internal reliability (Cronbach’s $\alpha = .83$).

Emotional self-efficacy was measured with six items from the emotion’s subscale of the Self-Efficacy for Children (Muris, 2001). Respondents were asked to what extent, on a range from 0 (not at all) to 4 (very well), they were able to, for example, “calm yourself down when you are very afraid” or “control your emotions”. The scale showed good internal reliability (Cronbach’s $\alpha = .88$).

Depressive symptoms were measured with five items from the depression subscale of the Brief Symptom Inventory (Derogatis, 1975). Respondents were asked to what extent, on a scale from 0 (not at all) to 4 (very much), they had been suffering from feelings of hopelessness, worthlessness, loneliness, apathy, or feeling blue. The scale showed good internal reliability (Cronbach’s $\alpha = .89$).

Statistical analysis

To perform a conditional process analysis, or in other words, a moderated mediation, the SPSS macro-PROCESS developed by Hayes (2012) was used. Since the cross-sectional nature of the data did not provide an empirical ordering of the variables, the model was informed by previous research. Thus, perceived support was assumed to precede emotional self-efficacy, depressive symptoms, and somatic symptoms. Somatic symptoms were proposed to stem either directly from experiences of perceived support, or indirectly via emotional self-efficacy, depressive symptoms, or both. Based on preliminary analyses, student gender, but

Table 1. Descriptive statistics (means and standard deviations) of study variables, separately for girls and boys, and for the full sample, as well as t-test of gender effects and screening of data characteristics (skewness and kurtosis).

	Girls	Boys	Gender differences	Total sample		
	<i>M (SD)</i>	<i>M (SD)</i>		<i>M (SD)</i>	Skewness	Kurtosis
Perceived social support (0–3)	2.00 (.75)	1.97 (.80)	–	1.98 (.47)	–.47	–.38
Somatic symptoms (0–4)	2.09 (.70)	1.53 (.67)	♀ > ♂ ***	1.81 (.74)	.24	.19
Emotional self-efficacy (0–4)	2.06 (.73)	2.57 (.69)	♀ < ♂ ***	2.31 (.76)	–.24	.12
Depressive symptoms (0–4)	1.39 (.85)	1.06 (.83)	♀ > ♂ ***	1.30 (.86)	.61	.17

Note: *** $p < .001$.

not school language or education level, was included as moderator (see Figure 1 for a conceptual model).

Prior to the mediation analysis, correlation and regression analyses were conducted to inspect the relationships between variables and to estimate effect sizes of the models. For the conditional process model, a bootstrapping procedure was chosen, with 5000 bootstrap samples used to calculate bias-corrected 95% confidence intervals (see MacKinnon, Lockwood, Hoffman, Wet, & Sheets, 2002; Preacher & Hayes, 2004). To avoid multicollinearity between main variables and interaction terms, all scales were standardized.

Results

Data screening and descriptive statistics

Among the respondents, 51% of the students reported that they would talk with their mother when worried about things, 31% that they would talk with their father, and 60% that they would talk with a friend. There were significant gender effects ($\chi^2 > 98.26$, $p < .001$), so that girls were less likely than boys to talk with their father, but more likely than boys to talk with their friends. In addition, 30–45% reported that they “maybe” would talk with one of their parents or with a friend. Further descriptive statistics for the unstandardized variables are presented in Table 1.

Correlational analysis

Pearson’s correlation coefficients for the variables are presented separately for boys and girls in Table 2. In part due to the large sample size, all correlations were highly significant. For both boys and girls, perceived support correlated positively with emotional self-efficacy

Table 2. Correlational analysis of dependent and independent variables, separately for girls (below the diagonal; N = 1642) and boys (above the diagonal; N = 1583).

	Perceived social support	Somatic symptoms	Emotional self-efficacy	Depressive symptoms
Perceived social support		-.12***	.27***	-.28***
Somatic symptoms	-.27***		-.37***	.49***
Emotional self-efficacy	-.28***	-.45***		-.48***
Depressive symptoms	-.38***	.53***	-.49***	

*** $p < .001$.

and negatively with depressive symptoms and somatic symptoms. As expected, emotional self-efficacy correlated negatively with both depressive symptoms and somatic symptoms, which in turn correlated positively with one another. No correlations between mediators were so strong as to suspect multicollinearity ($r \leq [.49]$). However, based on Fishers r -to- z transformations, the correlations between perceived support and both depressive and somatic symptoms were more significant for girls than for boys ($z_{\text{dep}} = 4.20$, $p < .001$; $z_{\text{som}} = 4.20$, $p < .001$). No correlations were significantly different for students in Finnish vs. Swedish-speaking schools, nor for middle school vs. secondary school students ($z \leq 1.79$). For both boys and girls, there were significant but not substantial correlations between student age and depressive symptoms, and between student age and somatic symptoms ($r < .10$, $p < .01$).

Conditional process analysis

Using the SPSS macro-PROCESS (Hayes, 2012), a conditional process model was applied with perceived support as the predictor, somatic symptoms as the outcome, emotional self-efficacy and depressive symptoms as mediators, gender as moderator, and student age as covariate. The complete model accounted for 40% of the variation in somatic symptoms; the main results of the model are presented below and summarized in Table 3.

As seen in Table 3, the total effect of perceived social support ($\beta = -.17$, 95% CI $[-.21, -.14]$) was partially mediated by emotional self-efficacy ($\beta = -.07[-.09, -.05]$) and even more so by the depressive symptoms ($\beta = -.13[-.15, -.11]$); indirect effect contrast $> .05$ $[.03, .08]$). There was also a significant moderation effect by gender ($t_{(3, 3221)} = 4.99$, $p < .001$), so that the impact of perceived social support on somatic symptoms was stronger for girls ($\beta = -.26[-.31, -.21]$) than for boys ($\beta = -.10[-.14, -.06]$). Finally, there was a significant moderated mediation, so that the indirect effect of depressive symptoms was stronger for girls than for boys (index of moderated mediation = $.05[.02, .08]$). In other words, the relation between perceived social support and somatic symptoms was stronger for girls, and this difference was in part explained by sex differences in depressive symptoms.

Table 3. A conditional process model of perceived social support on somatic symptoms: total effect, direct effect, and indirect effects through emotional self-efficacy and depressive symptoms, for the full sample and moderated by gender.

	Total effect (c)	Direct effect (c')	Indirect effect(s)		
			Emotional self- efficacy (ESE)	Depressive symptoms (DS)	Indirect effect contrast
Full sample	-.17 ^a	.03 ^a	-.07 ^a	-.13 ^a	DS > ESE ^a
Girls	-.26 ^a	-.05 ^a	-.06 ^a	-.15 ^a	DS > ESE ^a
Boys	-.10 ^a	.05 ^a	-.05 ^a	-.10 ^a	DS > ESE ^a
Moderation	♀ > ♂	-	-	♀ > ♂	-

Note: Hyphenated^amarks effects where the 95 % confidence interval does not include .00, which indicates a rejection of the null hypothesis ($p < .05$). Indirect effect contrast indicates whether one mediator pathway is significantly stronger than the other.

Discussion

Previous research suggests connections between social relationships and health, and also between mental and physical health (Cohen, 1988; Holt-Lunstad et al., 2010; Pinker, 2015). In the current study we explicitly assessed the roles of emotional self-efficacy and depressive symptoms as the mediators of perceived support and physical health. Next, we reiterated the main findings and discussed them in relation to previous research.

First, as hypothesized, perceived social support from parents and friends significantly predicted psychosomatic health among the Finnish teenagers. In the words of Cobb (1976, p. 300), “belonging to a network of communication and mutual obligation, being esteemed and valued by others, and being loved and cared by others” is important for all human beings. The finding is in line with previous studies providing evidence that perceived social support positively effects physiological health (Feeney & Collins, 2015; Helsen et al., 2000; Låftman & Östberg, 2006).

Second, the relationship between perceived social support and somatic symptoms was almost fully mediated by both emotional self-efficacy and depressive symptoms. These findings add to previous research suggesting, on the one hand, that social factors play a significant role for the development of emotion regulation and dysregulation (Marroquín et al., 2019; Schwarzer & Knoll, 2004), and internalizing symptoms (e.g., Grant et al., 2006; Muris, 2010; Pössel et al., 2018), and, on the other hand, that reports on a physical wellbeing are influenced by psychosocial risk factors (Liu & Umberson, 2008; Muris, 2002). In addition, research on related constructs have found similar results. For instance, quality support has been found to reduce negative affect (Krantz & McCeney, 2002) but foster positive affective states such as love and belonging that protect health (Umberson & Montez, 2010). Previous studies also suggest that a supportive social connection may help individuals build resilience (Feeney & Collins, 2015), whereas dysfunctional emotion regulation strategies have been found to influence physiological disease (Yildiz & Duy, 2019). However, these studies have not explored the process by use of mediation models. Notably, our total model with depressive symptoms and emotional self-efficacy as mediators accounted for 40% of the

variance in somatic symptoms, which highlight the strong connection between these phenomena.

In the final model, depressive symptoms was the main mediator, nevertheless emotional self-efficacy provided added value (see [Table 3](#)). This may suggest that the pathways from social support to somatic symptoms are not just about protection against negative somatic outcomes (via internalizing symptoms) but also about promotion of positive health effects (via increased emotional self-efficacy). It should also be noted that there is overlap between the concepts, as shown in the moderate correlations. Previous research has noted that support from family and friends promotes the ability to identify and describe emotions in oneself, which in turn decreases psychological stress (Saikkonen et al., 2018), and that more effective strategies to regulate emotions influence depression outcomes (Marroquín et al., 2019; see also Caprara et al., 2008; Muris, 2002; Schwarzer, 2014). Depression is associated with a reduced ability to use effective emotion regulation strategies (Joormann & Stanton, 2016), and thus, depressive symptoms are linked to the low levels of emotional self-efficacy (Muris, 2002). Further studies are encouraged to further explore the interconnectedness between emotion regulation and internalizing symptoms in relation to somatic symptoms, for example by a two step mediation process.

Third, girls scored higher on depressive symptoms and somatic symptoms and lower on emotional self-efficacy than boys, and the total relationship between perceived support and somatic symptoms was found to be significantly stronger for girls than boys. This is in conformity with the previous research stating that social relationships are more important for girls when it comes to the changes in health status (Miething et al., 2016). Moreover, the conditional process model indicated that depressive symptoms were a more prominent mediator between perceived social support and somatic symptoms for girls than for boys. These findings are in line with other studies showing that girls on average exhibit higher levels of emotional vulnerability in relation to their social relationships (e.g., Hakala et al., 2002; Kingery et al., 2007; Miething et al., 2016; Perquin et al., 2000; however, see van Harmelen et al., 2016; Sinclair et al., 2012, for contrasting results). In terms of emotional self-efficacy, it was an equally important mediator for both girls and boys, accounting for health promotion. It is possible that the lack of a significant moderation effect for emotional self-efficacy is due to the covariation of the gender moderation effect on depressive symptoms. One interpretation would be that boys and girls equally benefit from the way social support protect against somatic symptoms by promoting increased self-regulation, whereas the negative outcomes for physical and mental health caused by lack of support are particularly prominent among girls. Again, further studies are recommended to expand our knowledge on gender effects on the pathways from social support to physical health.

Limitations

As this study is based on a cross-sectional research (Taris & Kompier, 2014), dependent, independent, and mediating variables are simultaneously assessed, which limits the interpretation in terms of cause-and-effect relationship. Longitudinal and prospective surveys could shed more light on the psychosocial health behaviour across the lifespan. Also, while the use of the PROCESS macro allowed us to perform a conditional process model and

employ a boot-strap approach within the familiar SPSS framework, the macro did not allow for multi-step mediation or for multiple simultaneous outcomes in the mediation models.

In the current study, perceived social support was assessed by asking students to whom they would turn to in times of need, with predefined options to choose from including mother, father, friends, teachers, and other school staff. The scores from parents and friends were selected for the final scale, however the reader should be aware that social support may be defined differently in other studies. As noted by Cutrona and Russell (1990), perceived social support may be viewed both in terms of emotional (e.g., expressions of empathy), instrumental (e.g., tangible aid), and informational (e.g., advice giving) support. Future studies are recommended to replicate the study with validated scales for the measurement of family and peer support.

Also, exploratory qualitative research (Silverman, 2016) may provide a more detailed picture about the dynamics of social support and individuals' emotions and opinions connected to such close relationships.

Conclusion and directions for a future research

Comprehensibly, social relationships affect a wide range of health outcomes, including psychological and physical health. Fostering close quality relationships may benefit psychological health of adolescence, which in return, would enhance their physical health. The effects of social relationships have interim and continuing effects on health that emerge in childhood and continue throughout the lifespan. The current analysis adds to a growing number of studies in establishing the importance of social support for the development of both mental wellbeing and physical health. Yet, much remains to be learned and understood about the process by which quality relationships influence mental and physical health, and thus, collaborative efforts are needed for a future research.

First, future studies in the Nordic countries and internationally may do well to adapt a comparative approach to address the generalizability of the current study, and to test whether or to what extent social or socio-cultural context influences the proposed model. Thus, future research programs are recommended to jointly explore the causal mechanisms of the pathway between social support and somatic symptoms and to clarify intra- and interpersonal processes between the social, mental, and physical health. These linkages could be further contextualized among different groups in different environments.

Second, collaborative efforts among the social scientists are encouraged to elucidate a concept of quality social relationships. There is a vast literature describing social relationships within the study fields of psychology and sociology. However, it is not always clear what constitutes a quality social relationship in different social and demographic contexts. Also, a more accurate categorization of the types of support (e.g., parents, friends) during different stages in life would be helpful in future studies on social relationship as an indicator for healthier, happier, and even longer life.

Third, somatic symptoms have mainly been studied among the patient samples within the fields of pediatric psychology, neuroscience, and psychiatry. More studies on a population-level would recognize patterns of health behavior shared across populations. These studies could help to evaluate mind-body interrelationships, which in turn would facilitate prevention and treatment of the physical symptoms manifested by mind not only among

the patient samples, but also within the healthy populations. Multidisciplinary studies of both scientific research and practice could attempt to address psychological and neurobiological aspects of the somatic symptoms leading to a disorder or illness before it occurs.

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No potential conflict of interest was reported by authors.

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