Stress symptoms among adolescents: The role of subjective psychosocial conditions, lifestyle, and self-esteem

Karin Schraml a,*, Aleksander Perski a, Giorgio Grossi a, Margareta Simonsson-Sarnecki b

a Stress Research Institute, Stockholm University, SE-106 91 Stockholm, Sweden
b Department of Psychology, Stockholm University, SE-106 91 Stockholm, Sweden

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Adolescents
Psychosocial factors
Self-esteem
Gender differences

Abstract
Stress-related problems are increasing among Swedish adolescents, especially among females. The aims of this study were to survey the incidence of stress symptoms among 16-year-olds, to investigate the related gender differences, and to understand the factors that may contribute to stress symptoms. The study is questionnaire based, and the sample included 304 first-year high school students from two comparable schools. More than 30% of the high school students reported serious stress symptoms. Almost every second girl and every fifth boy reported that they felt stressed to a high degree. 8.2% were found to have severe stress symptoms, which would be considered a sign of chronic stress in adults. Besides the perception of high demands, low levels of global self-esteem, sleep disturbances, and poor social support played a crucial role in the prediction of stress symptoms. The findings highlight the need to develop and implement adequate stress prevention measures for adolescents.

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Introduction
Adolescence has been described as a period of storm and stress (Hall, 1904) and has been regarded as one of the most difficult periods in life (Arnett, 1999). At the root of this turbulence is the enormous number of major changes that take place during this time and the affects that they have on various areas of life (Nounopoulos, Ashby, & Gilman, 2006). These do not only concern bodily changes and awakening sexuality, but also include other psychological changes (e.g., regarding personality/identity development, personal values, commitments and expectations, and emerging desires for autonomy and independence) and social changes (e.g., regarding role ambiguity (child vs. adult), influence of peer-group, and sexual relationships), which can factor into the emergence of parental conflicts, mood disruptions, and risk behavior (Arnett, 1999; Marcia, 2006; Rosenberg, 1972). Considering the extensiveness and impact of these changes, it is understandable that adolescence can be experienced as stormy and stressful.

In recognizing the turbulence of adolescence, there is, however, a risk that these stress-related problems could be resignedly regarded as an inescapable norm – rather than as an indication that adolescents need help and support. Recent nationwide surveys in Sweden indicate that there have been dramatic increases in stress and serious stress-related health problems among Swedish adolescents (Bremberg, 2006; Hagquist, 2009; Socialstyrelsen, 2009). Over the past 20 years, the number of 16-year-olds reporting stress, fatigue, psychosomatic complaints as well as psychological and physical tension has been steadily rising.
groups of stress-related factors are examined, namely, adolescent subjective psychosocial conditions, lifestyle, and self-esteem. These symptoms are especially prevalent among adolescent females (Basow & Rubin, 1999; Hagquist, 2009), which suggests that girls may be more sensitive to stressors and/or may be facing different stressors than boys. For example, adolescent girls have been found to exhibit more depressive symptoms and anxiety than boys of the same age (Moksnes, Moljord, Espnes, & Byrne, 2010). It has been proposed, by Ruble, Greulich, Pomerantz, and Gochberg (1993), that girls are more vulnerable to stress and psychological problems, such as depression, due to differences in gender socialization processes during childhood.

Adolescents’ subjective psychosocial conditions

Research based on adults indicates that perceived high work demands are positively associated with elevated levels of stress (Bernin & Theorell, 2001) and chronic stress (Lindblom, Linton, Fedeli, & Bryneglsson, 2006). According to the job demand-control-support model, a higher risk of psychological strain and physical illness is to be expected among individuals who face high demands but who have little control or social support with which to handle these demands. Furthermore, the model suggests that each of the three components individually contributes to increased stress (Karasek & Theorell, 1990, pp. 89–103). Conversely, perceived control and high social support are considered to be buffers against stress and may thus decrease the risk for stress-related health problems (Lindblom et al., 2006).

According to Modin, Östberg, Toivanen, and Sandell (2010), the demands adolescents face in school are comparable to those of working adults (e.g., in terms of high workload, deadlines). Also, similar to adults who receive demands from many directions, the demands of young people tend to come from a number of different sources, such as parents, peers, school, and themselves (Bremberg, 2006).

In light of this, the fundamental theory of the job demand-control-support model, with regard to the expected effects of high demands, low control, and low social support on health, can conceivably be applied to adolescents as well as adults (Gillander-Gådin & Hammarström, 2000).

According to the latest results of the Survey of living conditions among children, 2009, a national longitudinal survey conducted among Swedish children and adolescents every other year, the perceived demands of adolescents were most often connected to school work, such as tests and homework. Moreover, 60% of the females in high school reported feeling stressed as a result of the demands that they put on themselves, whereas the corresponding figure for the males was 38% (ULF, 2009). As the experiencing of high demands increases during adolescence, social support and interpersonal relationships tend to deteriorate. For example, mood disruptions and subsequent conflicts with parents and peers are quite common. According to Rudolph (2002), girls are exposed to higher levels of interpersonal stress and react with more negative emotions than boys. They also tend to blame themselves for problems in relationships and, compared to boys, have been found to be more preoccupied with thoughts and concerns about others.

With regard to the experiencing of control during adolescence, Dedovic, Wadiwalla, Engert, and Pruessner (2009) have put forth an interesting explanation for the gender differences that have been found. According to these researchers, compared to boys, girls are more closely supervised and are not granted as much autonomy from adults, which sends the message that they are to be more dependent and passive, and less in control. Since it is less common for girls to experience that everything is within their control, they can more easily feel stressed.

Lifestyle habits

In Sweden, the number of young people who complain of daytime fatigue and sleep disturbances has increased dramatically in the past ten years, and the prevalence of sleeping problems is now at the same level as for adults
(Socialstyrelsen, 2009). Since chronic stress has been associated with poor sleep quality, sleep deprivation, and sleep disturbances (Armon, Shirom, Shapira, & Melamed, 2008; Ekstedt, 2005; Lund, Reider, Whiting, & Prichard, 2010), it is essential to take sleep and sleep disturbances into account as factors when studying adolescent stress.

Sleep disturbances affect daily functioning, for example, by negatively impacting academic performance and social interaction, and can, thereby, give rise to stressful experiences (Bernert, Merrill, Braithwaite, VanOrden, & Joiner, 2007; Brand et al., 2010). Stress, on the other hand, interferes with individuals’ ability to obtain adequate sleep. Fulgini and Hardway (2006) investigated the association between sleep and well-being among adolescents. According to their findings, studying and stressful demands during the day were associated with less sleep during the night and higher levels of anxiety, as well as with depressive feelings and daytime sleepiness the following day. Also, both occasional as well as persistent sleeping problems among adolescents have been observed to be associated with concentration problems, especially among females (Ipsiroglu, Fatemi, Werner, Paditz, & Schwarz, 2002).

Apart from sleep, other lifestyle factors, such as eating habits and physical exercise, can have a crucial effect on both physical and psychological well-being (Lien, 2006; Sundblad, Jansson, Saartok, Renström, & Enström, 2008; Wiles et al., 2008). Such behaviors often take root in adolescence and are difficult to change later in life. Healthy lifestyle habits, for example, eating regular meals and proper physical exercise, can help prevent physical stress reactions, while negative lifestyle habits can be associated with greater susceptibility to stress. Earlier research has shown that females in particular skip breakfast more often and engage in physical exercise less frequently than males (Palme et al., 2001).

**Self-esteem**

Among other personal characteristics, disturbances in self-esteem are believed to contribute to the high prevalence of psychosomatic symptoms and stress (Birndorf, Ryan, Aunger, & Aten, 2005; Rhee, Holditch-Davis, & Miles, 2005; Stinson et al., 2008). Global self-esteem is defined as the overall positive or negative attitude towards the self (Rosenberg, 1972). High global self-esteem has been found to be related to positive self-evaluations, characterized by having an accepting attitude towards one’s self, and has been identified as a crucial factor in preventing stress and mental health problems such as depression (Avison & McAlpine, 1992; Major, Barr, Zubek, & Babey, 1999; Rector & Roger, 1997). In contrast, low global self-esteem has been found to be associated with negative self-evaluations, characterized by self-doubts and self-rejection (Baumeister, Campbell, Krueger, & Vohs, 2003), and has been shown to predict stress symptoms and ill-health (Birndorf et al., 2005; Kivimäki & Kalimo, 1996). Renstig and Sandmark (2005) maintain that the lower global self-esteem of females is due to gender differences in the socialization process during early childhood. According to them, parents expect more from their daughters in terms of adaptation, diligence, and good behavior than from their sons. These higher expectations may inhibit the daughters from feeling that they are unconditionally loved and worthwhile individuals, which are defining factors for high global self-esteem.

Global self-esteem has to be distinguished from lower order factors that represent contingent aspects of self-evaluation such as performance-based self-esteem (Crocker & Wolfe, 2001). Typically, individuals with high performance-based self-esteem have a strong need to prove their competence and to exert maximum effort in order to feel worthy. For these individuals, the experiencing of failures and setbacks are detrimental to their self-esteem and need to be overcome through great efforts to perform better (Hallsten, Josephson, & Torgén, 2005). Ruble et al. (1993) point out that females tend to be more pessimistic and concerned about future success, and that they show more maladaptive attributions for success and failures which prevents them from feeling content with themselves and their performance. Their attitude towards success probably reinforces performance-based self-esteem. To base one’s self-esteem merely on success has been shown to have a harmful influence on health (Johnson, 1997; Johnson & Forsman, 1995) and to play a crucial role in the development of chronic stress by increasing the risk of psychological and physiological exhaustion (Hallsten, Bellaagh, & Gustafsson, 2002; Hallsten et al., 2005; Perski, 2006).

**Aim**

Given the above findings, the objectives of the current study were: (1) to survey the incidence of severe stress symptoms and chronic stress among adolescents, (2) to better understand the factors that may contribute to or exacerbate stress symptoms in adolescents, and (3) to examine possible gender differences.

Based on the information gathered from identifying the predictors of stress symptoms, practical measures can be designed for increasing the psychological well-being of adolescents, which may help prevent stress-related health problems later in life.

**Method**

**Participants and procedure**

In Sweden, school is compulsory for children between the ages of seven and sixteen. Following this, they may choose to pursue vocational training or may enroll in high school (a three-year education). While continuing on to high school is optional, its completion is necessary in order to get accepted to college. The final grades, which are based on students’ total
academic performance throughout high school, are crucial in determining their academic futures. In the present study, the participants were in their first year of high school and were selected from two schools in the same upper middle-class suburban area of Stockholm.

After approval by the local ethics review board, the data collection took place over the course of one week in February 2006. Prior to the data collection, the parents of the participants were informed in writing about the study's aims and procedures and were asked to sign a consent form, agreeing to their child's participation in the study. In addition, in an effort to increase participation, presentations were given to all first-year high school students at both schools to inform them about the purpose of the study.

The sample included 304 first-year high school students, of whom 159 were males (52%) and 145 were females (48%). The average age of the participants was 16 years (± one year). The data collection was organized in collaboration with the school staff. During a designated school lesson, all of the participating students answered the questionnaires individually and in silence in the presence of a school staff member. The average completion time for the questionnaires was approximately 30 min. At both schools, the response rate was very high (98%) even though participation was voluntary.

Measures

Several scales were utilized in the testing. To investigate chronic stress, the Shirom-Melamed Burnout Measure (SMBM) was used, which contains 22 items (graded 1–7) that measure different facets of chronic stress by focusing on the depletion of an individual's energy resources (Melamed et al., 1992). Respondents are asked to rate the degrees of physical, emotional, and psychological stress symptoms that they are experiencing (e.g., I feel physically exhausted; I have difficulties concentrating; I feel restless; I feel like I have had enough, etc.) (Shirom & Melamed, 2006). High scores indicate an intense degree of perceived stress symptoms. An overall chronic stress index can be calculated according to the four dimensions of burnout, tension, listlessness, and cognitive difficulties. In this study, as in previous studies, a rating of 4 or above was considered to be indicative of serious stress symptoms (Grossi, Perski, Evengård, Blomkvist, & Orth-Gomér, 2003), while 5 or above was seen as an indicator of chronic stress, in line with findings concerning adult patients in clinical settings (Perski, 2006). The Cronbach's α coefficient for this scale was determined to be 0.90.

Rosenberg's self-esteem scale (RSE-scale) was also utilized in the present study and is the most extensively applied instrument for the assessment of global self-esteem (Baumeister et al., 2003; Butler & Gasson, 2005; Rosenberg, 1972; Vispoel, Boo, & Bleier, 2001). It consists of 10 generally formulated items (graded 1–4) which enable a global self-assessment (e.g., sometimes I feel rather worthless; there is nothing I could be proud of; in general, I am quite content with myself, etc.). High scores in this assessment indicate high global self-esteem, which reflects a respondent's overall feeling of being good enough. In the present study, the cut-off point for high global self-esteem was fixed in the middle of the scale at 2.5. The Cronbach's α coefficient was 0.90.

The Performance-Based Self-esteem scale (PBS-scale) (Hallsten et al., 2005) consists of four items (graded 1–4), and was used to assess to what degree the respondents' self-esteem is based on performance and success (I think I sometimes try to prove my worth by being competent; My self-esteem is far too dependent on my daily achievements; At times, I have to be better than others to be good enough for myself; Occasionally I feel obsessed to accomplish something of value). In this study, high scores indicate high performance-based self-esteem, which was indicated by a rating of 4 or above. This cut-off point was determined by summarizing the groups' mean with one standard deviation. The Cronbach's α coefficient was 0.80.

Perceived demands and control were measured by 11 items (graded 1–4) as according to Karasek and Theorell (1990), pp. 89–103. Demands were measured using an index of five items concerning qualitative and quantitative demands, such as time pressure and conflicting demands (e.g., Do you feel life is too demanding?; Are there many conflicting demands in your life?, etc.). High scores indicated that the perceived demands were high. The Cronbach's α coefficient was 0.80. The control index included six items to capture such areas as skill discretion and authority over decisions (e.g., Can you make decisions about your life on your own?; I constantly need to learn new things in order to deal with my life, etc.). Low scores indicated a lack of perceived control. The Cronbach's α coefficient was 0.54.

Social support was measured by an index of 6 items (graded 1–4) and focuses on the social climate in school (e.g., I get along well with my schoolmates; There is a good sense of togetherness in my class, etc.) (Bernin & Theorell, 2001). High scores indicated that the social support was high. The Cronbach's α coefficient was 0.70.

Nine questions (graded 1–5) taken from the Karolinska sleep questionnaire (KSQ), were used to construct a sleep index concerning sleeping disturbances (e.g., I have difficulties falling asleep; I do not feel well-rested when I wake up in the morning; I experience disturbed sleep, etc.) (Kecklund & Åkerstedt, 1992). The Cronbach's α coefficient was 0.73.

Three questions measured lifestyle habits, consisting of a two-question eating habit index (graded 1–5) (How often do you skip breakfast?; How often do you skip lunch?) and one question (graded 1–5) measuring physical exercise habits (To what extent do you exercise physically?).

Data analysis

The first aim of the study was to survey the incidence of severe stress symptoms and chronic stress among adolescents. In our analysis of the SMBM questionnaire data, minimum cut-off scores were set to demarcate at what point both stress and chronic stress were perceived, which were based on earlier studies and clinical settings (Grossi et al., 2003; Perski, 2006).
A simple frequency analysis for both males and females was then carried out. By conducting a one-way ANOVA, three stress groups (representing non-stressed, stressed, and chroniclly stressed adolescents) could be compared, and post hoc tests (Scheffé) of the least significant differences were performed on all pairwise comparisons.

The second aim was to determine which factors may contribute to or exacerbate stress symptoms in adolescents. To do this, a linear stepwise regression analysis was conducted. Starting with no variables, the variables were then added one by one into the model to test whether they were statistically significant. The purpose of this statistical analysis was to examine the order of entry of the predictors into the model, as well as the relative strength of the relations between the predictors and the outcome.

The study’s last research question, regarding possible gender differences, was investigated by another one-way ANOVA. The statistical analyses were carried out using the Statistical Package for Social Sciences (SPSS) version 16.0 for Windows.

Results

**The incidence of stress symptoms and chronic stress among adolescents**

One hundred participants (32.9%) exceeded the cut-off score (≥4) in the SMBM, indicating that about one-third of the high school students reported a high degree of stress symptoms. This group consisted of 68 (45.9%) females and 32 (20.5%) males. Furthermore, we found that the scores of 25 participants (8.2%) either reached or exceeded the cut-off score of 5 in the SMBM, which in our previous clinical studies indicated a high risk of a clinical state of chronic stress among adults (Grossi et al., 2003). More than five times as many females (n = 21) than males (n = 4) were in this group. In other words, 14.2% of all female participants exceeded the cut-off score for chronic stress, whereas the corresponding figure was only 2.6% for males. The reported levels of stress symptoms were then compared among all three groups. The first group, the “no-stress group,” consisted of students who reported stress symptoms to a low degree (n = 191). The second group, the “stress symptoms group,” included those who experienced stress symptoms to a high degree, with SMBM scores between 4 and 5 (n = 75). The third group, the “chronic stress group,” consisted of the 25 high school students who exceeded the critical score of 5 in SMBM.

As shown in Table 1, the overall F-value was significant for almost all of the examined variables. There were no significant differences between the groups in regard to physical exercise habits. Post hoc tests (Scheffé) of least significant differences were subsequently performed on all pairwise comparisons. All three groups were significantly different from one another in respect to demands, social support, and eating habits. The chronic stress group reported experiencing significantly higher demands and less social support, and reported more negligent eating habits than individuals from the stress symptoms group, who experienced higher demands and less social support, and reported less regular eating habits than the no-stress group. Regarding global self-esteem, performance-based self-esteem, and sleep disturbances, significant differences were found between the no-stress group and the other two groups but not between the two stress groups. In other words, the individuals in the no-stress group reported significantly higher global self-esteem, less performance-based self-esteem, and less sleep disturbances than those in the other two groups. Concerning perceived control, students in the no-stress and stress symptoms groups did not differ significantly from each other, whereas the chronic stress group experienced significantly less control.

**Prediction of stress symptoms**

Another purpose of the present study was to identify what impact the studied variables had on stress symptoms. A stepwise regression analysis was thus conducted to examine the impact and order of entry of the predictors. The stress symptoms (SMBM) were set as the criterion variable for the regression analysis. The predictor variables were global and performance-based self-esteem, demands, control, social support, sleep disturbances, eating habits, and physical exercise.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Between-Group Differences on stress-related variables.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No stress(n=191)</strong></td>
<td><strong>Stress symptoms(n=75)</strong></td>
</tr>
<tr>
<td><strong>M</strong></td>
<td><strong>SD</strong></td>
</tr>
<tr>
<td>Global self-esteem</td>
<td>3.44</td>
</tr>
<tr>
<td>Pb* self-esteem</td>
<td>2.93</td>
</tr>
<tr>
<td>Demands</td>
<td>2.77</td>
</tr>
<tr>
<td>Control</td>
<td>2.97</td>
</tr>
<tr>
<td>Social support</td>
<td>3.35</td>
</tr>
<tr>
<td>Sleep disturbances</td>
<td>2.66</td>
</tr>
<tr>
<td>Eating habits</td>
<td>1.90</td>
</tr>
<tr>
<td>Physical exercise</td>
<td>3.66</td>
</tr>
</tbody>
</table>

*Pb* - Performance-based.
habits. The results indicated that high demands, low global self-esteem, sleep disturbances, low social support, and negligent eating habits contributed significantly to the variance explained in stress symptoms (see Table 2).

Demands emerged as the first predictor and accounted for the highest amount of variance explained in stress symptoms ($41.1\%$, $p < 0.001$. The final model explained $56.3\%$ of the variance in stress symptoms ($\text{Adj} R^2 = 0.563$). The results from the analysis of variance ($F_5, 279 = 74.194; p < 0.001$) indicated a good fit for the model. Performance-based self-esteem, control, and physical exercise habits did not emerge as significant predictors in the regression analysis. The correlations between the examined variables are shown in Table 3.

Gender differences

Gender differences regarding the examined variables are presented in Table 4. Females reported stress symptoms to a significantly higher degree than males. They showed lower levels of global self-esteem and higher levels of performance-based self-esteem. They also reported experiencing higher demands in school, and assessed their sleeping quality as being poorer, as compared to the males. There were no differences observed between the males and females in respect to both perceived social support and degree of control. Moreover, the eating and physical exercise habits of these groups did not differ. The females and males both reported that they engaged in physical exercise and the frequency of their missed breakfasts and lunches was equal.

Discussion

The results of the present study confirm that a substantial number of high school students, especially females, feel stressed and psychologically burdened (Bremberg, 2006). Almost exactly one-third of the total group, 100 respondents, reported that they experienced a high degree of stress symptoms. This group consisted of 68 (45.9\%) females and 32 (20.5\%) males. Considering the age of the respondents (most were about 16-years old), this is an alarming number of affected adolescents.

In addition, a substantial number of students (8.2\%) were determined to be chronically stressed, in that they reached or exceeded the critical score of 5 in the SMBM. Compared to the other participants, this group reported experiencing higher demands, less control, and less social support, which, according to the job demand-control-support model, indicates a higher risk of ill-health (Karasek & Theorell, 1990, pp. 89–103; Modin et al., 2010). That so many young people seem to be on the verge of serious stress-related health disturbances appears to be a new and particularly alarming finding.

Furthermore, the study showed that highly stressed individuals, are more likely to feel worse about themselves, base their self-esteem on performance, and have more sleep problems as compared to non-stressed individuals. Moreover, members of the chronic stress group reported experiencing less control in comparison to the other groups. This would imply that they lacked an important buffer against stress, according to the theory of Karasek and Theorell (1990), pp. 89–103.

The stepwise regression analysis to test the potential predictors of the variables was revealing. It showed that 56\% of the variation in stress symptoms was predicted by high demands, low global self-esteem, sleep disturbances, low social support and negligent eating habits. Indeed, demands, followed by global self-esteem, were found to play a crucial role in the prediction of stress symptoms.

Table 2

<table>
<thead>
<tr>
<th>Predictors</th>
<th>B</th>
<th>SE</th>
<th>Beta</th>
<th>t</th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>Demands</td>
<td>0.583</td>
<td>0.078</td>
<td>0.369</td>
<td>7.481</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Global self-esteem</td>
<td>-0.391</td>
<td>0.068</td>
<td>-0.260</td>
<td>-5.782</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Sleep disturbances</td>
<td>0.312</td>
<td>0.082</td>
<td>0.195</td>
<td>3.820</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Social support</td>
<td>-0.301</td>
<td>0.091</td>
<td>-0.137</td>
<td>-3.302</td>
<td>0.001</td>
</tr>
<tr>
<td>Eating habits</td>
<td>0.077</td>
<td>0.036</td>
<td>0.091</td>
<td>2.134</td>
<td>0.034</td>
</tr>
</tbody>
</table>

Table 3

Partial correlations among study variables ($n=285$), control variable: gender.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
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<th>3</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Stress symptoms</td>
<td>1</td>
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<td></td>
<td></td>
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<tr>
<td>2 Global se$^*$</td>
<td>-0.503**</td>
<td>1</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>3 Pbs$^*$</td>
<td>0.245**</td>
<td>-0.250**</td>
<td>1</td>
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<tr>
<td>4 Demands</td>
<td>0.617**</td>
<td>-0.354**</td>
<td>-0.418**</td>
<td>1</td>
<td></td>
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<tr>
<td>5 Control</td>
<td>-0.213**</td>
<td>-0.113</td>
<td>-0.012</td>
<td>-0.178*</td>
<td>1</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>6 Social support</td>
<td>-0.344**</td>
<td>-0.252**</td>
<td>-0.092</td>
<td>-0.249**</td>
<td>-0.256**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Sleep disturbances</td>
<td>0.540**</td>
<td>-0.357**</td>
<td>-0.229**</td>
<td>0.534**</td>
<td>-0.176*</td>
<td>-0.183**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Eating habits</td>
<td>0.321**</td>
<td>-0.208**</td>
<td>0.101</td>
<td>0.229**</td>
<td>-0.023</td>
<td>-0.125</td>
<td>0.377**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9 Physical exercise</td>
<td>-0.051</td>
<td>0.029</td>
<td>0.194**</td>
<td>0.066</td>
<td>-0.009</td>
<td>0.045</td>
<td>-0.043</td>
<td>-0.158*</td>
<td>1</td>
</tr>
</tbody>
</table>

*p<.01
**p<.001
$^*_{self-esteem}$
$^a_{Performance-based self-esteem}$
The gender differences found in the present study support the conclusions of earlier investigations (Basow & Rubin, 1999; Bremberg, 2006; Murberg & Bru, 2004). Compared to their male counterparts, the females not only reported significantly more stress symptoms, lower global self-esteem, and higher performance-based self-esteem, but also reported perceiving higher demands and having more difficulties sleeping. Furthermore, it was shown that female students constituted the majority of the chronically stressed group. The severity of their stress symptoms was comparable to that of adult patients in stress clinics (Perski, 2006). Unfortunately, this study cannot conclusively explain the reasons for the higher prevalence of stress among females; however, a number of possible causes for these gender differences are worth discussing.

A large body of research links gender differences observed in regard to stress exposure and reactivity during adolescence to differences in individuals’ early socialization processes (Dedovic et al., 2009; Ruble et al., 1993). According to Renstig and Sandmark (2005), lower global self-esteem among females stems from parents’ tendency to place greater expectations on their female offspring. Eagerness, ambition, and politeness are fostered by parents who reinforce such qualities by showing disappointment when their daughters do not behave in a way they consider to be proper. Boys, in contrast, are encouraged to counteract stress. The lower global self-esteem of females might also impede their ability to say no to demands (Renstig & Sandmark, 2005), which may lead to the experiencing of stress and stress symptoms.

There is reason to believe that high performance-based self-esteem may underlie females’ experiencing of higher demands. Individuals with high performance-based self-esteem are driven by self-generated inner demands and high standards in order to prove their personal worth (Hallsten et al., 2005). Another finding points out that females in particular make efforts to fulfill their parents’ expectations and strive to perform well by trying to achieve the best grades (Murberg & Bru, 2004). Furthermore, females take on more responsibility compared to males (Gillander-Gådin & Hammarström, 2000), which could be another possible cause for their experiencing of high demands.

Adolescent girls have also been found to be more sensitive than boys to the opinions and evaluations of others (Rudolph, 2002). They are also more negatively affected when they receive feedback indicating that they are not performing adequately (Dedovic et al., 2009; Ruble et al., 1993). Thus, females’ levels of perceived self-worth and, consequently, even their general well-being, are more likely to fluctuate depending on how they themselves or others, especially parents evaluate their achievements.

Furthermore, the combination of females’ highly ambitious strivings and their concerns over their ability to cope with demands and meet standards, either from themselves or from parents, could lead to stress and, in turn, more pronounced sleeping difficulties. Such problems with sleep can generate even more stress, which may lead to a vicious cycle (Fuligni & Hardway, 2006).

The experiencing of social demands that are impossible to fulfill, such as the exaggerated demands that may be put on females’ physical appearance, may likely be another crucial source of stress and low global self-esteem among females. Based on previous studies, it can be assumed that females’ tendency to base their self-evaluations on the evaluations of significant others makes it difficult for them to feel content with themselves (Dedovic et al., 2009; Rudolph, 2002). Unfortunately, gender-specific social stressors have not been investigated in the present study.

It is also possible that the gender differences observed in the results may be attributable to differences in how each gender tends to respond to questionnaires. Studies among adults show that females tend to report symptoms and problems more readily than males (Marklund, 2000).

**Study limitations**

The first limitation relates to the sample used and its generalizability. Although the distribution of the sexes was relatively balanced in the sample, with 159 male and 145 female 16-year-old high school students, one should be cautious in generalizing the results to all high school students. This is due to the fact that the sample mainly consisted of adolescents from one specific
area, Lidingö, an upper middle-class suburb of Stockholm. However, the proportion of the students reporting stress symptoms as well as the dominance of females is similar to earlier mentioned reports (Bremberg, 2006; Palme et al., 2001).

The second limitation concerns the study’s design. Studies among adolescents that are only based on self-report instruments of personal traits can be problematic. During this period, the respondents’ personality and identity development are still not complete, which may contribute to fluctuating self-perceptions (Kroger, 2006; Marcia, 2006). In addition, because the study was cross-sectional, it is not possible to determine causal direction among the variables. Longitudinal studies on this topic are therefore warranted.

Finally, the number of study variables was rather limited. Although the independent variables could explain almost 56% of the variance in stress symptoms, more than 40% of the variance remained unexplained. Obviously, stress among adolescents is a rather complex phenomenon.

Conclusions

The most interesting findings in the present study are that: (1) more than 30% of the high school students reported experiencing serious stress symptoms, while a subgroup of 8.2% were found to have severe symptoms, which would be considered a sign of chronic stress in adults and thereby indicate a heightened risk for stress-related diseases later in life; (2) females reported experiencing more stress and exhaustion problems than males; and (3) high demands and low global self-esteem were the predictor variables that accounted for the greatest amount of the variance associated with stress symptoms.

The fact that serious stress symptoms were found in 30% of the adolescents studied and that the same percentage has been found for adults indicates that this phenomenon should not be simply regarded as a passing occurrence within the “normal” storm-and-stress period (Arnett, 1999; Hall, 1904) but should, rather, be seen as the first phase of a potentially prolonged state involving future health implications. The study’s alarming findings have to be taken seriously. If stress-related problems in adolescence are dismissed as normal, there is a risk that young people will not receive the help they actually need. Thus, although the cross-sectional design of this study fords any causal conclusions, it seems warranted to emphasize the importance of developing various practical strategies for helping with these problems. Ideally, the findings would be useful for developing practical, gender-specific strategies for this purpose, but unfortunately, this study did not take a closer look at the gender-related effects of specific stressors. This would be a productive area for future studies on this topic to pursue.

However, for the time being, we propose the use of more general strategies that take into account and address the most crucial predictors of stress symptoms found in the present study – in order to improve the handling of demands, raise global self-esteem, provide means of reliable social support, and to encourage healthier lifestyle habits such as adequate sleep.

For those high school students who perceive demanding situations as threatening rather than challenging, encouraging cognitive re-evaluations may be a good starting point. This would enable them to learn how to cope with demands and setbacks in a more effective way (Nounopoulos et al., 2006). Other such practical measures could even focus on improving adolescents’ self-efficacy (Bandura, 2000) by raising their confidence in being able to master difficult situations.

High global self-esteem, a belief in one’s value as a person irrespective of external circumstances and events, is considered to be a resource against stress (Baumeister et al., 2003; Major et al., 1999). To better harness this resource, future longitudinal research could focus on evaluating practical measures that are intended to help boost adolescents’ self-esteem. This could best be accomplished, for example, by investigating whether the measures lead to direct positive effects on the stress levels of high school students or, considering the long term, by testing whether they prevent adolescents from experiencing exhaustion and stress later in life. Finally, another approach to this issue would be to specifically look at the therapeutic or educational activities that are concerned with the process of identity development and coping skills acquisition, since these are areas that can influence self-esteem.

In conclusion, further studies on the associations between the variables examined in the present study are called for, especially in the form of longitudinal research. The findings of the present study strongly indicate that stress symptoms and chronic stress are prevalent among today’s youth, and that there is a critical need to develop effective practical measures for minimizing stress and thereby its potential effects among adolescents and female adolescents in particular.

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