



## Physical activity, resilience, and depressive symptoms in adolescence



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### ABSTRACT

Promoting mental health by facilitation of physical activity and resilience is of great importance in adolescence. This cross-sectional study investigated the association between physical activity and resilience, in relation to depressive symptoms among adolescents. Resilience is based on five factors: personal competence, social competence, structured style (planning, structure, and daily routines), social resources, and family cohesion.

Norwegian adolescents 13–18 years old ( $N = 1100$ ; 51% girls and 49% boys) participated in the study. Girls scored lower in physical activity, and higher in social resources and depressive symptoms than boys, while boys scored higher in personal competence and structured style. For both genders the hierarchical multiple regression analysis showed a negative association between the resilience factors and depressive symptoms. Higher levels of physical activity were associated with lower levels of depressive symptoms for girls. There was no significant association between physical activity and depressive symptoms among boys. There was, however, an interaction effect for boys indicating that the association between structured style, and depressive symptoms depends on the frequency of physical activity.

Acknowledging the association between physical activity, resilience, and the outcome of depressive symptoms may be important in developing health promotion programs for young people, especially girls.

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### 1. Introduction

The role of personal resources as protective factors and their contribution to the development of health during adolescence has been given attention (Hjemdal, Aune, Reinfjell, Stiles, & Friberg, 2007; von Soest, Mossige, Stefansen, & Hjemdal, 2009). It is important to identify and understand protective factors contributing to preventive strategies (von Soest et al., 2009) especially among adolescents, as potential changes may have a long-lasting impact compared to the general population (Sawyer et al., 2012). Resilience is often defined as a process of normal and healthy functioning, moderating the negative effects of adverse life

conditions or trauma (Masten, 2001). Three main groups of protective factors related to resilience have been identified: family cohesion (parental support, monitoring, communication skills), social resources (community support, environment, and social structures) and personal dispositions (individual characteristics, self-regulation, self-esteem) (Hjemdal, Vogel, Solem, Hagen, & Stiles, 2011; Luthar, Cicchetti, & Becker, 2000; Zolkoski & Bullock, 2011). Interesting gender differences in resilience are found in some studies, where boys report higher intrapersonal dispositions, whereas girls report more social and interpersonal resources (Hjemdal, Friberg, Stiles, Martinussen, & Rosenvinge, 2006; Hjemdal, Friberg, Stiles, Rosenvinge, & Martinussen, 2006; Hjemdal et al., 2011). Adolescents who report negative life events score lower in resilience than adolescents with few or no such experiences (Hjemdal, Friberg, Stiles, Martinussen, et al., 2006). Resilience has become a conceptual umbrella that encompasses virtually all protective factors.

One specific protective factor, physical activity, has also gained a more important role in the understanding of health behavior

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(Gerber & Pühse, 2008; Haskell et al., 2007; Strong et al., 2005). Life events seem to affect physical activity both positively and negatively (Engberg et al., 2012). Transition to university and having a child are life events that seem to decrease physical activity, while retirement and new relationships are life events that could increase physical activity (Engberg et al., 2012). Experiences of stress seem to decrease physical activity (Moljord, Moksnes, Eriksen, & Espnes, 2011; Stults-Kolehmainen & Sinha, 2014).

Physical activity seems to lead to positive psychosocial outcomes (Andreassen, 2009; Biddle & Asare, 2011; Pickett, Yardley, & Kendrick, 2012), and adolescents who are engaged in frequent physical activity report higher scores for protective factors related to resilience than others (Hjemdal, Friborg, Stiles, Martinussen, et al., 2006; Strohle, 2009). It has been reported that adolescents who participate in activities that require social interaction and cooperation score higher in resilience than others (Hjemdal, Friborg, Stiles, Martinussen, et al., 2006). One study (Gerber et al., 2012) reported that individuals who engaged in the recommended level of physical activity had stronger mental toughness than those who did not.

The recommended level of physical activity is moderate activity  $\geq 5$  days/week ( $\geq 30$  min) or  $\geq 3$  days/week of vigorous activity ( $\geq 20$  min) (Gerber et al., 2012). The relationship between physical activity and mental health among adolescents is generally found to be weak or moderate (Biddle & Asare, 2011; Larun, Nordheim, Ekeland, Hagen, & Heian, 2006). Some studies have reported that higher levels of physical activity and sport participation are associated with lower levels of depressive symptoms (Hallal, Victora, Azevedo, & Wells, 2006; Kirkcaldy, Shephard, & Siefen, 2002; Motl, Birnbaum, Kubik, & Dishman, 2004; Sagatun, Sogaard, Bjertness, Selmer, & Heyerdahl, 2007; Sund, Larsson, & Wichstrom, 2011). Meanwhile, other studies have reported no association between depressive symptoms and physical activity (De Moor, Boomsma, Stubbe, Willemsen, & de Geus, 2008; Rothon et al., 2010). Girls report more depressive symptoms than boys (Dishman et al., 2006; Hjemdal et al., 2011; Moksnes, Moljord, Espnes, & Byrne, 2010), and depressive symptoms and disorders seem to increase, especially among girls, during middle adolescence (Dishman et al., 2006; Hjemdal et al., 2011; Moksnes et al., 2010; Motl et al., 2004). Interestingly, the frequency of leisure time physical activity and physical exercise is reported to decrease during adolescence, when girls' general participation is lower than that of boys (Duncan, Duncan, Strycker, & Chaumeton, 2007; Nesheim & Haugland, 2003; Sagatun et al., 2007; Trost et al., 2002). A more recent study has reported no gender differences in the frequency of physical activity (Moljord et al., 2011).

The Resilience Scale for Adolescents (READ) (Hjemdal, Friborg, Stiles, Martinussen, et al., 2006) is a measure of protective factors associated with resilience. It measures resilience factors across the three main groups of protective factors, but it does not measure the protective factor of physical activity. Therefore, the relationship between depressive symptoms, physical activity, and READ is worth investigating. There are to the authors' knowledge few studies investigating the association and possible interaction effects between resilience and physical activity related to levels of depressive symptoms in adolescence. One study (Skrove, Romundstad, & Indredavik, 2012) used two resilience factors, family cohesion and social competence, in association with depressive symptoms and healthy/unhealthy lifestyle behaviors (physical activity among others). They found a substantial effect of resilience on the association between unhealthy lifestyle behaviors and depressive symptoms. The present study includes all the READ factors both intra and inter personal. The aim of the present study was to explore the association between the variables of resilience

and physical activity and the outcome of depressive symptoms for girls and boys.

## 2. Method

### 2.1. Participants

Adolescents ( $N = 1229$ ) in junior and senior high schools from the urban areas of two counties in mid-Norway were asked to participate in the survey during autumn 2008. Overall, 1209 respondents (619 from senior high school and 564 from junior high school) from six different schools returned the questionnaires. A total of 1183 of the 1209 respondents (98%) were between the ages of 13 and 18. However, only those with complete data ( $N = 1100$ ) were included in the present study (51% girls and 49% boys). Mean age of the sample was 15.64 ( $SD = 1.74$ ). The mean age for girls was 15.66 ( $SD = 1.75$ ) and for boys 15.63 ( $SD = 1.74$ ).

### 2.2. Design and procedure

The present cross-sectional study is part of a research project, "Children and adolescents daily life, health, and well-being", which was approved by the Regional Committee for Medical Research Ethics (REK) and the Norwegian Social Science Data Service (NSD).

The adolescents and their parents received an information letter describing the purpose of the study and explaining that participation was voluntary, anonymous, and confidential. Demographic measures (age, sex, and school year) were collected and questionnaires were distributed directly to schools. The researcher gave information to the teachers on how the questionnaires should be filled out, and the teachers distributed the questionnaire to the students during classes lasting 45 min. The teachers were available to answer questions from students, who spent the session responding to the questionnaires. This procedure may explain the high response rate. Permission to carry out the study was given by the municipalities and the schools.

### 2.3. Instruments

*Physical activity* was measured using one item: "During the last four weeks, how many days per week have you participated in sports or physical activity so hard that you had high respiratory frequency, sweated, or had an increased heart rate for at least 20 min?" The response categories were: (1) Never, (2) Less than one day a week, (3) One day a week, (4) Two or three days a week, and (5) Mostly every day during the week. The question was adapted from Kurtze, Gundersen, and Holmen (2003) and used by Gerber and Pühse (2008) and Moksnes et al. (2010) for measuring leisure time physical activity. Test–retest reliability (8–12 days) is  $r = .73$  (Rangul, Holmen, Kurtze, Cuyper, & Midthjell, 2008).

*Depressive symptoms* were measured using a 15-item scale appropriate for measuring adolescents' non-clinical depressive attributes experienced during the previous week (Byrne, Davenport, & Mazanov, 2007). The scale was developed and used by Byrne et al. (2007), and the items refer to commonly experienced depressive features outlined in the Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revision (DSM-IV-TR) (American Psychiatric Association, 2000) and the Zung Self-Rating Depression Scale (Zung, 1965). Some items from the scale include: (1) I have felt sad or unhappy; (4) I have lost interest for things that were important for me before; (15) I have felt tired or have had low energy. The respondents are requested to rate the items on a five-point Likert scale ranging from 0 = *never* to 4 = *always*, where higher scores indicate more depressive symptoms. The sum scores

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