

This version of the article has been accepted for publication, after peer review and is subject to Springer Nature's [AM terms of use](#), but is not the Version of Record and does not reflect post-acceptance improvements, or any corrections. The Version of Record is available online at <https://doi.org/10.1007/s10902-013-9475-2>

Running head: CONTEXTUAL FACTORS IN SHAPING SOC

Obtaining a hierarchy of contextual factors in shaping the SOC of male and female adolescents

Irene García-Moya^{a*}, Carmen Moreno^a & Francisco Rivera^b

^a Department of Developmental and Educational Psychology, University of Seville

^b Department of Behavioral Sciences, University of Huelva; FABIS Foundation, Andalusian Public Health Service (SSPA).

Funding acknowledgement

The 2010 edition of the HBSC study in Spain was supported by the Spanish Ministry of Health, Social Policy and Equality. In addition, this work was supported by the Spanish Ministry of Education through the National Program FPU [grant number: AP2009-0978].

*Corresponding author:

Irene García-Moya

Address: Department of Developmental and Educational Psychology, University of Seville. C/ Camilo José Cela s/n. C.P. 41018. Seville (Spain).

e-mail: irenegm@us.es

Phone: + 34 954554331

Obtaining a hierarchy of contextual factors in shaping the sense of coherence of male and female adolescents

Abstract

Sense of coherence (SOC) is an important predictor of health and subjective well-being, but research on the factors that shape SOC development is scarce. Using SEM, this study obtained a hierarchy of the contributions of several contextual factors to SOC in a representative sample of adolescents ($N = 4943$, M age = 15.43) selected for the *Health Behaviour in School-aged Children* survey in Spain. Goodness-of-fit indices consistent with good fit, logical parameter estimates and a level of explained variability of 38.2% were found in the final model. The examination of parameter estimates provided a hierarchy of contextual factors in shaping SOC. Quality of parent-child relationships was the most influential factor and appeared at the top of the hierarchy. Positive models of behavior in the peer group, neighborhood assets and classmate support occupied intermediate positions, and teacher support appeared at the bottom of the hierarchy. Multi-group analysis revealed more commonalities than differences between male and female adolescents, with the exception of teacher support, which seemed to have a higher significance for the SOC of females.

Keywords: sense of coherence; adolescence; developmental contexts; salutogenesis; gender differences

More than thirty years ago, the salutogenic model (Antonovsky 1979) was formulated as an alternative to the dominant pathogenic model in the study of health. Drawing on the assumption that stressors are ubiquitous in life, attention was directed at factors that improve people's ability to successfully cope with stressors; that is, instead of focusing on the causes of disease, attention was directed at the precursors of health.

Since that time, and especially in recent decades, the salutogenic model has received increasing attention in the study of health and subjective well-being (Lindström and Eriksson 2010), and it has been viewed as a promising theoretical framework for guiding health promotion interventions (Dean and McQueen 1996; Eriksson and Lindström 2008). Sense of coherence (SOC), which is the central variable in the salutogenic model, has shown strong positive associations with improved health and quality of life (for a review, see Eriksson and Lindström 2006, 2007): Not only does SOC protect against ill-health (Hochwälder in press), e.g. preventing the experience of negative life events (Hochwälder and Forsell 2011), but it also promotes subjective well-being and life satisfaction (Moksnes, Løhre and Espnes in press; Wiesmann and Hannich in press).

Importantly, the salutogenic model fits with Positive Psychology in the sense that they both advocate for changing the focus of research: replacing the predominant interest on how to prevent risks and repair problems (the disease-oriented pathogenic or deficit approach) by research on how to build positive qualities (Seligman and Csikszentmihalyi 2000).

Overcoming the deficit approach is particularly important in adolescence, a period of transition marked by dramatic physical, cognitive and social changes, which implies risks but also opportunities. Unfortunately, research on the risks

and vulnerabilities associated with this period of life has dominated developmental science for years (Steinberg and Morris 2001), and has resulted in a negative and limited view of adolescence (Damon 2004). In contrast, salutogenesis is consistent with new approaches to the study of adolescent well-being that emphasize adolescents' strengths and assets for health, such as the *assets model* (Morgan and Ziglio 2007), the *positive youth development* paradigm (Damon, 2004; Lerner, Phelps, Forman and Bowers 2009) and *resilience* (Masten 2001; Werner and Smith 1992). Indeed, the asset model incorporates salutogenesis as a useful framework for the search of evidence on the key assets for health (Morgan and Ziglio 2007).

Furthermore, adolescence has been considered a key developmental stage for exploring the origins of SOC (Evans, Marsh and Weigel 2010; Marsh, Clinkinbeard, Thomas and Evans 2007). Given that SOC is not considered to be completely established until the third decade of life (Antonovsky 1987), the preceding years are especially suitable for analyzing its development, and in the case of adolescence, evidence supports the application and usefulness of SOC at this stage (Honkinen, Suominen, Rautava, Hakanen and Valimo 2006).

Unfortunately, little research has been conducted on the factors that contribute to SOC development in adolescence. Nevertheless, an investigation of potential SOC-promoting factors would add new insights in understanding SOC development while providing valuable information for the design of salutogenic-guided interventions to foster subjective well-being. For that reason, the present study is aimed at increasing knowledge on the sources of SOC by analyzing the role of potential SOC-promoting factors within the main developmental contexts in adolescence. The potential gender differences are also explored drawing on

recent research which suggests that the effects of certain factors on SOC may be different between men and women (Volanen, Lahelma, Silventoinen and Suominen 2004). Specifically, Volanen and colleagues found that living without a partner and the possibility to use personal knowledge and skills at work had a higher impact on the SOC for men than for women.

The development of SOC

SOC is defined as “a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (1) the stimuli deriving from one’s internal and external environments in the course of living are structured, predictable and explicable (comprehensibility); (2) the resources are available to one to meet the demands posed by the stimuli (manageability); and (3) these demands are challenges, worthy of investment and engagement (meaningfulness)” (Antonovsky 1987, p. 19). High levels of SOC result in an increased capacity to deal with stressors resulting from the demands of everyday life. Thus, although overall stress is negatively associated with happiness (Schiffirin and Nelson 2010), personal factors, such as SOC, can contribute to explain why, faced with similar amounts of stress, certain individuals are more likely to maintain happiness and well-being.

The attainment of a strong SOC depends on the presence of General Resistance Resources (GRRs), defined as characteristics of an individual or collective group which facilitate successful coping with the inherent stressors of human existence and contribute to strengthening SOC via three types of experiences which reinforce the comprehensibility, manageability and meaningfulness components, respectively, of SOC: consistency, load balance and participation in outcomes (Antonovsky 1979, 1987).

GRRs include a wide array of resources, from physical and biochemical factors to macrosociocultural ones (Antonovsky 1979), some of which are found in people's personal attributes and capacities while others are part of their proximal and distant environments (Lindström and Eriksson 2010). Among them, we will focus on GRRs in adolescents' proximal environments, paying special attention to interpersonal and relational resources.

Family is considered the first potential provider of SOC-promoting experiences in life (Antonovsky 1987). As the years pass and daily life expands beyond the family, it is natural that other contexts become providers of meaningful experiences to SOC as well. In fact, the contributions from family and other developmental contexts to SOC have begun to be explored and this type of research seems to support the conclusion that developmental contexts provide meaningful experiences that shape SOC development. Thus, a positive climate of relationships within the family (Olsson, Hansson, Lundblad and Cederblad 2006) as well as perceived affection, ease of communication, parental knowledge and a good relationship between the parents (García-Moya, Rivera, Moreno, Lindström and Jiménez-Iglesias 2012) have been underlined as key family dimensions that are positively associated with SOC. Regarding school, support from classmates (Natvig, Hanestad and Samdal 2006) and teachers (Bowen, Richman, Brewster and Bowen 1998) has shown positive associations with SOC. Finally, the role of peers and the neighborhood has seldom been explored, but some findings hint at their potential effects on SOC development (Evans et al. 2010; Kuposov, Ruchkin and Eisemann 2003; Marsh et al. 2007; Moksnes, Rannestad, Byrne and Espnes 2010).

In contrast, rarely have several settings been studied simultaneously. In fact, to our knowledge, no research exists concerning the interplay between settings in shaping adolescent SOC, a fact that has been noted by a systematic review on this topic, in which the interested reader can find a more detailed description of the contributions of developmental contexts to SOC development (Rivera, García-Moya, Moreno and Ramos in press).

Building a model of the influences from developmental contexts on the adolescent SOC

In building a model of the relationships among experiences from several developmental contexts and SOC during adolescence, developmental psychology literature provides a broader and more extensive framework to understand and complement the evidence provided by SOC research.

One fundamental tenet in developmental psychology is that adolescent development cannot be understood without considering the everyday life experiences that occur within the main developmental contexts in their lives (Steinberg 2002). As noted by Smetana, Campione-Barr and Metzger (2006), the study of adolescent development is becoming more relational, with an increased awareness of the importance of considering influences beyond the family and the linkages among various developmental contexts.

The ecological model (Bronfenbrenner 1979) and its more recent formulation the Person-Process-Context-Time model (Bronfenbrenner and Morris, 1998, 2006) have been important influences in driving this change. Thus, the initial formulations of the ecological model highlighted the importance of the context in human development and the Person-Process-Context-Time model incorporated the concept of *proximal processes*, as the primary mechanisms in

development. Specifically, as described by Bronfenbrenner and Morris (1998, p. 996), “human development takes place through processes of progressively more complex reciprocal interaction between an active, evolving biopsychological human organism and the persons, objects, and symbols in its immediate external environment”. Thus, in this meta-theory, which continues to dominate the field of adolescent development (Smetana et al. 2006), the interactions between developing persons and their environments are considered to be fundamental in understanding human development.

Therefore, turning to the main developmental contexts in adolescence (family, school, peer group and neighborhood) as a strategy for identifying potential SOC-promoting factors in this period of life is strongly supported by the developmental literature.

The fundamental role of the family as the main socialization context during childhood persists during adolescence despite the increasing power of influences from other contexts such as the peer group or school (Parke and Buriel 2006; Steinberg and Silk 2002). In fact, the quality of the interactions within the family context has important and diverse implications for the adolescent’s well-being, adjustment and mental health (for a review, see Laursen and Collins 2009). Family is also an important context in the development of shared values and ideologies concerning the social realities surrounding the adolescent (Reiss 1981).

Second, most of the adolescents’ time outside the home is spent in school; consequently, the extent to which school is perceived as a supportive environment is also crucial for the adolescent’s well-being. In short, supportive classmates and teachers have been found to be related to a positive school climate and increased well-being among students (Danielsen, Samdal, Hetland and Wold 2009; Gådin

and Hammarström 2003; McLellan, Rissel, Donnelly and Bauman 1999), whereas alienation, school-related stress (Natvig, Albrektsen and Qvarnstrøm 2003), and in the most negative cases, bullying (Due et al. 2005) have been associated with negative consequences for the adolescent's health (for a detailed review on the school as a developmental context, see Eccles and Roeser 2011).

Another important influence that is especially meaningful during adolescence comes from the relationships with peers. The importance of peers significantly increases during this stage, and adolescents usually spend most of their leisure time with cliques, which become very influential socialization settings (Brown 2004; Rubin, Bukowski and Parker 2006). Mechanisms explaining the remarkable similarity between adolescents and their peer group (Prinstein and Dodge 2008) still have not been completely unraveled, but it seems that after controlling for selection effects, much of the similarity remains, indicating that it has to do with socialization (Jaccard, Blanton and Dodge 2005). Peer cliques seem to become an important reference for adolescents to understand acceptable and desired behaviors and extensive research has documented the effects of peer influence on an adolescent's involvement in health-threatening behaviors (e.g., De Vries, Engels, Kremers, Wetzels and Mudde 2003; Windle 2000). Despite certain negativity bias in research on this topic (Brechwald and Prinstein 2011), positive socialization effects have also been reported regarding interpersonal abilities, moral development and the adoption of prosocial behaviors (Barry and Wentzel 2006; Laible, Carlo and Roesch 2004).

Finally, in spite of having been much less extensively studied, the neighborhood can also be viewed as a relevant developmental context in adolescence. Thus, the characteristics of the neighborhood and the type of

behaviors to which adolescents are exposed to as a result of living in a given neighborhood have been proven to significantly affect adolescents' development (for a detailed review, see Leventhal, Dupéré and Brooks-Gunn 2009; McBride, Berkel, Gaylord-Harden, Copeland-Linder and Nation 2011). Although most studies have focused on the analysis of disadvantaged neighborhoods by using population census data in the assessment of the neighborhood characteristics, in the present study, we will conceptualize neighborhoods as potential providers of assets for health and well-being, as proposed by several recent studies (Kawachi 2010; Oliva, Antolín, Estévez and Pascual in press). Furthermore, an analysis of the neighborhood based on the residents' subjective perspectives has been considered a useful strategy to deepen the understanding of the impact of neighborhood characteristics on adolescent well-being (Burton, Price-Spratlen and Spencer 1997).

The former evidence supports our decisions regarding the selection of variables for the present study from family, school, peers and neighborhood. Specifically, we selected a measure of the quality of parent-child relationships, two measures of support at school (classmate support and teacher support), a measure of the presence of positive models of behavior in the peer group and a measure of neighborhood assets as perceived by the adolescents.

However, most of the aforementioned contextual influences are not independent but are closely interrelated. Thus, the ecological model underscores the importance of the *mesosystems*, defined as the connections among the *microsystems* in which the individual's life occurs (Bronfenbrenner 1979).

Establishing the direction of the influences among developmental contexts has proven to be a complex task, and more research is still needed to completely

clarify the nature and direction of the linkages among these developmental contexts in shaping adolescent well-being. Despite the challenging nature of this endeavor, the present study sought to incorporate some of the more extensively documented relationships among contexts into model building. In particular, there is large consensus concerning the idea that family influence goes far beyond the family context, thereby exerting additional influence on adolescent development via its impact on other contexts. In this respect, the following linkages have been underlined: (1) the association between attachment internal working models developed in parent-child relationships and the ability to develop trusting relationships with other adults outside the family; and (2) the associations between the quality of parent-child relationships and the parents' capacity to guide the adolescent's selection of peers.

Thus, a direct effect from the quality of parent-child relationships on teacher support is supported by the tenet that the quality of parent-child relationships acts as a reference for the development of internal models of close and intimate relationships, thereby conditioning the adolescent's ability to build subsequent trusting relationships with significant others (Bowlby 1988; McElhaney, Allen, Stephenson and Hare 2009). Lakey and Dickinson (1994) found that perceptions of support within the family environment seemed to be generalized to new social relationships, and several studies on the sources of social support have suggested that subjective perceptions of teacher support are dependent to some extent on templates developed within parent-child relationships (e.g., Reddy, Rhodes and Mulhall 2003).

Regarding the direct influence of the quality of parent-child relationships on positive models of behaviors in the peer group, parents have been hypothesized

to play an important role in their children's selection of friends by encouraging their children to befriend others that share their values. Thus, evolving from their direct role as organizers of contact with peers and providers of the social networks that provide potential peers throughout childhood (Parke and Buriel 2006), parents continue playing a role in their adolescent children's selection of friends by means of diverse peer-focused management strategies, such as *guiding* (when parents talk with the adolescent about the consequences of being friends with particular people), that have shown an association with a reduced likelihood of befriending deviant peers (Mounts 2002). Interestingly, the closer and warmer the relationship between parents and their adolescent children, the higher the likelihood that parents influence their children's selection of friends. Conversely, conflictive parent-child relationships have frequently been found to lead to associations with deviant peers (Brody et al. 2001; Werner and Silbereisen 2003).

Brief summary of the present study and objectives

In the present study, SOC research and developmental psychology literature were combined to hypothesize two alternative models of the effects of several key factors from family, school, peers and neighborhood on SOC during adolescence (see Figure 1). Specifically, using Structural Equation Modeling (SEM) analyses and the strategy of competing nested models, we took as a starting point a simple model (model 1) which only included independent effects of each contextual factor on SOC, in line with the predominant approach in previous research on SOC development in adolescence. In model 2, developmental psychology literature was incorporated into model building and, drawing on the evidence reviewed in the preceding subsection, direct paths from quality of parent-child relationships to models of behavior in the peer group and

teacher support were also included. It is important to note that the decision to model only those two additional paths was not based on the belief that no connection exists among the remaining contexts. Instead, the rationale behind that decision was not modeling relationships among contextual factors when research was lacking on the associations between the specific factors examined, the findings were quite equivocal regarding the direction of the associations or the nature of the mechanisms underlying the linkages seemed unclear.

(Figure 1 about here)

The aims of the study were as follows:

1. To test an integrative model including potential contributions from the main developmental contexts on SOC development during adolescence. Drawing on SOC research and adolescent psychology literature, all of the examined factors were predicted to have significant positive associations with adolescents' SOC.
2. To study the relative importance of the examined variables according to the magnitude of their influence on the adolescent SOC. In this respect, the quality of parent-child relationships was predicted to show the strongest influence on adolescent SOC (Antonovsky 1987; Laursen and Collins 2009). In addition, given that most time outside the home is spent at school and increasing time is spent with friends during adolescence, support at school and models of behavior in the peer group were expected to occupy intermediate positions. Finally, based on the small to modest magnitude of the neighborhood effects on adolescent outcomes reported by non-experimental

studies (Leventhal et al. 2009), neighborhood assets were predicted to be the less influential factor.

3. To test the invariance of the final model across genders in order to identify potential gender differences in the importance of the examined variables.

Recent research on adult populations has shown significant differences in the importance of certain contextual and relational factors for the SOC of men and women (Volanen et al. 2004). Accordingly, it was predicted that some significant differences among male and female adolescents may exist as well. The lack of previous research on gender differences in SOC-promoting factors during adolescence explains the exploratory nature of this third objective.

Method

Participants

A representative sample of Spanish adolescents was selected as part of the 2010 edition of the WHO international survey *Health Behaviour in School-aged Children* (HBSC) in Spain. The current study focused on the 4943 participants (2368 boys and 2575 girls) aged 13 to 18 years ($M = 15.43$, $SD = 1.41$) who had answered all of the items herein analyzed. Younger adolescents were excluded because the SOC scale was not part of the 11- to 12-year-old participants' questionnaire.

Measures

The HBSC questionnaire includes an extensive core of mandatory questions, optional packages that probe deeper into various areas of interest, and questions that cover particular national needs (Roberts et al. 2009). In this study, measures were selected from the 2010 HBSC Spanish questionnaire. The

Experimentation Ethical Committee of the University of Seville certifies that both the instrument and the survey procedure comply with all ethical requirements for human research according to the European Union criteria.

Supportive climate at school.

Two factors related to a supportive climate at school were used: classmate support and teacher support, which were measured by means of two well-known scales whose original versions were developed and validated within the international HBSC network (see Torsheim, Wold and Samdal 2000). Classmate support consisted of 3 items such as *Most of the students in my class(es) are kind and helpful* and *Other students accept me as I am*. Teacher support included 5 items such as *My teachers are interested in me as a person* and *My teachers encourage me to express my own opinions in class*. Both scales have been slightly modified according to the latest improvements in HBSC protocol and are now answered on a 5-point Likert scale from 1-*Strongly disagree* to 5- *Strongly agree*.

Quality of parent-child relationships.

This factor consisted of four indicators: (1) affection, a single measure that includes both maternal and paternal affection scores in the corresponding dimension of the PBI-PC (Klimidis, Minas and Ata 1992); (2) communication, assessed by the combination of two items that ask about ease of communication with father and mother; (3) parental knowledge, which results from the combination of the scales on maternal and paternal knowledge (Brown, Mounts, Lamborn and Steinberg 1993); and (4) family satisfaction, which is a measure developed within the HBSC study on the basis of the Cantril Ladder on life satisfaction (Cantril 1965), but limited to family relationships. A detailed

description of each indicator and the resulting composite measure on quality of parent-child relationships as well as their psychometric properties can be found in García-Moya, Moreno and Jiménez-Iglesias (in press).

Neighborhood assets.

This factor assesses the presence of various assets, as perceived by the adolescents, in the area where they live. It consists of 6 items answered on a 5-point Likert scale that were developed within the HBSC network and are partially based on the ones used to assess social capital by Kawachi, Kennedy, Lochner and Prothrow-Stith (1997). Some examples of the items in this factor are: *You can trust people around here*, *There are good places to spend your free time (e.g., leisure centers, parks, shops)* and *I feel safe in the area where I live*.

Positive models of behavior in the peer group.

This factor includes three indicators selected from the set of HBSC optional items assessing the frequency of several behaviors in the peer group (Gaspar de Matos et al. 2009), that are answered on a scale from 1-*Never or almost never* to 3-*Very often*. For the purpose of this study, only the following items, which referred to positive behaviors, were selected: *Most of the friends in my group...get along well with parents, do well in school and participate in sports or cultural activities*.

Sense of coherence.

SOC was assessed by means of the SOC-29 Scale (Antonovsky 1987). This scale consists of 29 items answered on a 7-point Likert scale with bipolar anchoring phrases. The following are examples of the items in the SOC-29 Scale: *Do you have the feeling that you are in an unfamiliar situation and don't know*

what to do? (comprehensibility), *Do you think that there will always be people whom you'll be able to count on in the future?* (manageability) and *How often do you have the feeling that there's little meaning in the things you do in your daily life?* (meaningfulness). The SOC-29 has shown good reliability and validity in several countries (Antonovsky 1993; Eriksson and Lindström 2005) and provides a global score as well as separate scores for each component: comprehensibility, manageability and meaningfulness. In the SEM analysis, mean values of the three aforementioned dimensions of the SOC-29 scale were used as indicators for the latent factor representing the SOC.

Procedure

Data collection complied with the three criteria dictated by the HBSC international protocol: the students themselves answered the questionnaires, data collection took place in the school and the participants' anonymity was ensured. A computer-assisted web interviewing system was employed for data collection that allowed students to fill in the questionnaires through the Internet. This procedure allowed automatic incorporation of the students' answers to the project database, thus reducing potential human errors associated with data computerization.

Data analysis

The two hypothesized models described in the introduction section were assessed through SEM with Maximum Likelihood estimation using EQS 6.1 (Multivariate Software Inc., Encino, CA). Robust statistics were used to prevent problems associated with deviations from normality. Both models complied with the requirements for identification. In fact, both models were overidentified.

Two-step modeling (Anderson and Gerbing 1988; Kline 2011) was employed for the estimation of the models. This procedure implies the respecification of a structural regression model as a confirmatory factor analysis model and the separate analysis of this measurement model fit (step 1) as a prerequisite for analyzing the structural part of the model (step 2). As part of this strategy, latent factors are allowed to correlate in the analysis of the measurement model, so that poor fit (if appears) is clearly attributable to wrong hypotheses on the measurement part, which should be respecified before proceeding with the second step.

After the examination of the measurement model, the strategy of comparing competing nested models was employed for the second step: the two hypothesized structural regression models were built and compared in terms of their goodness of fit by means of chi-square differences and the following approximate goodness-of-fit indices: NNFI or TLI, CFI, RMSEA and SRMR. Values of NNFI and CFI higher than .90 are considered to be indicative of acceptable fit (McDonald and Ho 2002), although Hu and Bentler (1999) recommended values of .95 or higher. RMSEA values lower than .06 and SRMR of .08 or less are also desired in a well-fitting model (Hu and Bentler 1999). The Lagrange Multiplier Test (LM test) and the Wald Test were also performed in case minor modifications were found that improved the model fit. It is important to note that modifications are suggested exclusively on the basis of empirical criteria by these tests, but in the present work, no modification was taken into account that was not theoretically sound.

Finally, SEM multi-group analysis was used to examine invariance across gender for the model that showed the better goodness of fit. Specifically, the

following aspects were tested: whether the obtained model held true for both groups and whether the path coefficients among latent factors could be considered equal between boys and girls. For that purpose, we examined the model fit for boys and girls separately and used those results as a baseline for testing the invariance of path coefficients. Specifically, equality constraints for all path coefficients in both groups (boys and girls) were imposed simultaneously, and the constrained model fit was compared to the previous nested model. According to Cheung and Rensvold (2002), a decrease in CFI lower than .01 in the more constrained model and the maintenance of acceptable values for the rest of indices indicates that the invariance hypothesis can be accepted. In addition, to detect parameters that may significantly vary across groups, the LM Test for releasing constraints was also employed.

Results

The covariance matrix is presented in a separate file as supplementary material. Next, the main outcomes of the statistical analyses are summarized in different subsections.

Examining the measurement model

Preliminary analysis of the measurement model was conducted as the first step. In this type of analysis, appropriate goodness-of-fit indices are indicative of unidimensionality for each of the latent factors.

The following values were obtained for the absolute and approximate goodness-of-fit indicators: $\chi^2 = 1530.13$, $p < .001$; NNFI = .958, CFI = .964, RMSEA = .031 (90% CI = .029, .033) and SRMR = .028.

The chi-square statistic suggested the rejection of the exact fit hypothesis. However, the chi-square statistic is affected by the sample size, which makes it possible that slight discrepancies result in a statistically significant test when the sample is large, as is the case in this study. In contrast, approximate fit indices suggested a different conclusion. Thus, SRMR, which is a residual-based index, indicated that model-data discrepancies were small (lower than .08). In addition, the lower bound of the RMSEA interval (less than .05) supports the close-fit hypothesis, whereas the upper bound (lower than .10) is consistent with rejection of the poor-fit hypothesis. The values of CFI and NNFI also suggested appropriate fit.

Model selection

As for the structural model, the two hypothesized models were tested as a series of nested models. The LM Test and Wald Test were also performed on the best fitting model in case some minor modification was identified that could contribute to a better fit.

Table 1 shows the absolute fit indicator chi-square, the chi-square difference, and approximate goodness-of-fit indices for each model.

(Table 1 about here)

As shown in Table 1, Model 2 led to a significant improvement in model fit, but the problematic value of SRMR still suggested that some significant discrepancies between the model and the data existed. The LM Test suggested modification of Model 2 by adding a path between the family factor and the neighborhood factor. Given that significant associations have been reported between the quality of family relationships and neighborhood factors (Leventhal et al. 2009) but that the mechanisms underlying those associations are not clear,

Model 2 was re-specified with the inclusion of a covariance between those two factors (see Model 2b). This change caused a new significant improvement in model fit as indicated by the chi-square difference, although the model's chi-square value was again significant. Nevertheless, the RMSEA values were consistent with the close-fit hypothesis and rejection of the poor-fit hypothesis, and the SRMR value indicated a decrease in the model-data discrepancies in Model 2b compared to Model 2. The former, with NNFI and CFI around .94, was consistent with a good fitting model. In addition, the parameter estimates were inspected and appeared logical, and the predictive power of the model, as indicated by the explained level of variability in SOC scores, reached 38.2%.

A graphical representation of the final structural model and the parameters obtained from the complete sample of adolescents is presented in Figure 2. The model showed significant direct effects of each factor on SOC. In addition, the Sobel Test revealed significant indirect effects of quality of parent-child relationships on SOC via teacher support ($z = 5.06, p < .001$) and via models of behavior in the peer group ($z = 7.94, p < .001$).

(Figure 2 about here)

Effect decomposition

The tracing rule excluding tracings that involved unanalyzed associations (i.e., covariances) was employed for effect decomposition using standardized parameters. Total effects for each latent factor on SOC are presented in Table 2.

(Table 2 about here)

As shown in Table 2, quality of family relationships was the most influential variable because an increase by one standard deviation in this variable

implied an increase in SOC of .48 standard deviations via the described direct and indirect effects between these variables (see Figure 2). According to the magnitude of their total effects on SOC, the quality of family relationships was followed by the models of behavior in the peer group, neighborhood assets, classmate support and teacher support.

Invariance across gender

Finally, the obtained model was tested separately for boys and girls by means of SEM multi-group analysis. The following results indicated that the model held for both groups: CFI=.946; NNFI=.939; RMSEA=.026 and SRMR=.071. Imposing equality constraints for the seven path coefficients across groups resulted in the following indices: CFI=.944; NNFI=.940; RMSEA=.026 and SRMR=.072. Both the decrease in CFI (which was lower than .01) and the maintenance of the remaining indices in acceptable values are consistent with the invariance hypothesis.

Although the aforementioned results supported the applicability of the same model to boys and girls and the invariance of path coefficients in the model as a whole, some differences were noticeable in the estimates of certain parameters (See Figure 3).

(Figure 3 about here)

To test whether those differences were significant and consequently, whether certain path coefficients should not be considered invariant, the LM Test was used to check each of the constraints. In particular, the LM Test provided the sequence in which the constraints should be released so that the process resulted in significant improvements in fit. Those results are summarized in Table 3.

(Table 3 about here)

The statistics in Table 3 show that the release of two of the imposed equality constraints across gender would result in significant improvements in model fit. Specifically, the results indicate that the path coefficients between teacher support and SOC and between the quality of parent-child relationships and teacher support should not be considered invariant.

Discussion

In the present study, the contributions of several contextual factors from the main developmental contexts on adolescents' SOC were examined. A model was obtained that showed a good fit to the data and represented the relationships among the examined variables and SOC. In addition to the relationships between each contextual factor and SOC, the data supported the hypothesized continuities between parent-child relationships and both teacher support and positive models of behavior in the peer group. The final model also included a covariance between the quality of parent-child relationships and neighborhood assets. The appearance of that association is not surprising given that several studies suggest a linkage between these contexts (Leventhal et al. 2009). However, literature is not clear about the mechanisms underlying this association and its directionality. Furthermore, the connections between quality of parent-child relationships and neighborhood assets might also be a consequence of a spurious effect. For instance, socioeconomic status, which has been considered an important factor in neighborhood selection (Sampson and Sharkey 2008), may influence both quality

of parent-child relationships and neighborhood quality (Bornstein and Bradley 2003), thereby accounting for the aforementioned association to some extent.

Focusing on the relationship between the contextual factors and SOC, all examined factors (quality of parent-child relationships, classmate support, teacher support, models of behavior in the peer group and neighborhood assets) had significant positive effects on the adolescent SOC, as hypothesized. Nevertheless, as predicted, the magnitude of their influence was diverse, which makes it interesting to analyze the hierarchy of obtained effects, which was the central objective of the current study.

A global analysis of the obtained hierarchy shows that the quality of parent-child relationships was the most influential factor, with adolescents reporting parent-child relationships characterized by warmth, open communication, parental knowledge and high satisfaction being more likely to show a strong SOC. The second strongest contribution was from support at school (represented by teacher and classmate support) and the presence of positive models of behavior in the peer group, indicating that these two factors significantly influenced adolescent SOC as well. Finally, neighborhood assets also contributed to an increased SOC. This global picture is consistent with previous research and coincides with our initial hypotheses.

However, a more detailed analysis reveals significant differences between the impact of classmate support and teacher support on SOC. Thus, if we move to a factor-based hierarchy, classmate support occupies the fourth position (though it shows a rather similar effect to neighborhood assets), beneath the quality of parent-child relationships and models of behaviors in the peer group, whereas teacher support clearly appears at the bottom of the hierarchy. Although previous

research has reported a complementary effect of these two sources of support in reducing the perceptions of school-related stress and increasing SOC strength (García-Moya, Rivera and Moreno 2013), two factors may be related to the lower impact of teacher support compared to classmate support. First, classmate support and teacher support have different characteristics; whereas teacher support is generally school-centered and formal, classmate support is more informal and has more far-reaching impacts because contact with classmates is more likely to continue outside of school than contact with teachers (Danielsen et al. 2009). In addition, a decrease in the significance of relationships with teachers has been found in middle and late adolescence compared to previous stages (Bokhorst, Sumter and Westenberg 2010; Demaray and Malecky 2003), which is consistent with the position of teacher support at the bottom of the hierarchy.

Regarding the invariance analysis on potential gender differences in the impact of the examined contextual factors on SOC, it suggested more commonalities than differences between male and female adolescents. In a recent review on gender and adolescent development, Perry and Pauletti (2011) stated that differences between male and female adolescents are not as ubiquitous and large as previously thought; these differences quite often appear to be specific and of small magnitude, a view that is perfectly applicable to our findings regarding SOC development.

Thus, all the examined factors significantly contributed to the SOC of both boys and girls, and the overall importance of the examined factors was similar for both male and female adolescents with only one exception: the impact of teacher support on SOC, which was found to be significantly higher in girls. Gender differences have frequently been reported with respect to perceptions of teacher

support (Borkhost et al. 2010; Reddy et al. 2003), with girls perceiving higher levels of teacher support than boys. However, gender differences in the present study refer to the impact of teacher support on the SOC. In this respect, consistent with the finding that teacher support is more important for female adolescents' SOC, adolescent girls have been found to place more value on the support they receive from their teachers than boys (Demaray and Malecky 2003). Gender-based differences in coping styles may be related to the increased importance of teacher support for girls because adolescent girls seem to be more reliant on seeking social support as a coping strategy than boys (Seiffge-Krenke 2011). In this vein, studies on the responses of adolescents to victimization situations within the school show that adolescent girls are more likely than boys to seek help from their teachers when they are victims of bullying (Aceves, Hinshaw, Mendoza-Denton and Page-Gould 2010; Hunter and Boyle 2004). Although more research is needed on this topic, the lowered likelihood of seeking social support as a coping strategy in boys may be, at least to some extent, a consequence of gender stereotypes and ideologies that portray males as defiant of authority, emotionally stoic and self-reliant (Perry and Pauletti 2011); as a result, seeking support strategies could be interpreted as non-consistent with the masculine stereotype. Therefore, teacher support may not be considered a likely coping resource by male adolescents, which would explain its lower impact on SOC compared to that for female adolescents.

Interestingly, more continuity was found between parent-child relationships and relationships with teachers for boys than for girls, which may suggest that girls' ability to establish significant relationships with their teachers may be slightly more independent of the quality of parent-child relationships, whereas for boys, the templates of parent-child relationships tend to condition the

relationship with their teachers to a higher extent. In this vein, Drevets, Benton and Bradley (1996) stated that girls are more likely to discover important sources of support outside the family.

However, more research is needed to better understand gender differences in the factors contributing to SOC development. Research on this topic has been scarce, especially in adolescence, and a multidimensional focus and an integrative approach are clearly needed to clarify the role of gender in adolescent development (Galambos, Berenbaum and McHale 2009).

This study has some limitations that should be taken into account when interpreting its findings. First, this is a cross-sectional study, and consequently, it is not possible to make conclusions about the directions of the relationships represented in the models obtained. Because of this limitation, no directional pathway was included that was not supported by reviewed literature and research findings. Nonetheless, the possibility exists that some of the relationships represented as unidirectional could also be bidirectional. Besides, alternative models exist that would show a similar fit to the data compared to the proposed final model. Second, all contextual factors were evaluated by means of the adolescents' reports, which some could argue is a source of bias. However, the relevance of the adolescents' perceptions in understanding their health and well-being has been recently underscored by considering that incorporation of the expectations, cognitions and the subjective perspective of the participant is advantageous for studies devoted to understand adolescent well-being (Laursen and Collins 2009). Finally, caution is needed regarding comparisons among developmental contexts. The present study allows comparisons among factors, but a context-based analysis would assume that the four contexts (family, school, peer

group and neighborhood) were equally well measured, which was not the case. For instance, in the case of the peer group, only a measure of positive models of behavior was available, and consequently, future research should attempt to incorporate additional fundamental factors, such as the quality of the relationships with peers in terms of support, intimacy and relatedness, if a comparison of the potential impact on SOC of family, school, peer group and the neighborhood is to be performed.

Despite those limitations, this study makes an important contribution to the study of the relationships between SOC and contextual factors, thereby contributing to a better understanding of the factors that can positively shape SOC development. Furthermore, the study was conducted by integrating the four main developmental contexts of adolescence in the analyses, moving forward in research on the sources of SOC that have been dominated by single setting analyses to date, typically focusing on either family or school.

In addition, this work has some methodological strengths. Thus, despite the previously described limitations of SEM analysis, a model was obtained that complies with the three main goals for this type of analysis as described by Kline (2011): it makes theoretical sense, it is reasonably parsimonious and its correspondence to the data is acceptably close. The former was achieved by comparing competing nested models, which is considered the most useful strategy for reducing the risks associated with SEM's confirmatory nature (Hair, Anderson, Tatham and Black 2009). Additionally, in line with the recent recommendations about reporting on SEM (McDonald and Ho 2002), the procedure employed for the specification, estimation and evaluation of the presented models was thoroughly described and the covariance matrix was

provided as supplementary material, which we hope will facilitate a critical assessment of this work and if desired, allow future works to replicate the current analyses.

In sum, this work makes a significant contribution to the study of SOC in adolescence and in particular, to the identification of meaningful contextual factors that can facilitate the development of a strong SOC in this developmental stage. Given that a better understanding of the experiences that foster a positive appreciation of life and an increased ability to deal stress is fundamental for the design of health promotion interventions aimed at improving people's subjective well-being, the present study on SOC means a step forward in this field that may encourage more research aimed at answering a key question for salutogenic-guided health promotion interventions: what can be done to strengthen an individual's SOC?

In this respect, findings from the present study suggest the potential of contextual factors to positively contribute to SOC development in adolescence and, in particular, they underline the notable role of parent-child relationships in the attainment of a strong SOC. Therefore, it seems that salutogenic-guided interventions should pay special attention to promoting positive parent-child relationships as a useful strategy to promote SOC development. In addition, the fact that other contextual resources also made significant contributions is an equally important finding, since it suggests that health promotion interventions aimed at strengthening SOC should not neglect other developmental contexts whose contributions to SOC development have been traditionally little studied, which is especially the case of the peer group and the neighborhood.

Finally, given that the present study focused on external interpersonal-relational GRRs, future research should incorporate the analysis of the contributions of internal GRRs, among others self-esteem, self-efficacy and optimism, which have also been found to be positively associated with a strong SOC in diverse periods of the life span (e.g., Pallant and Lae 2002; Wiesmann and Hannich 2010). Further investigation on the role of the contextual factors in the present study and of other facets of the examined developmental contexts as well as on the patterns of interactions among contextual factors would also be beneficial.

References

- Aceves, M. J., Hinshaw, S. P., Mendoza-Denton, R., & Page-Gould, E. (2010). Seek help from teachers or fight back? Student perceptions of teachers' actions during conflicts and responses to peer victimization. *Journal of Youth and Adolescence*, *39*, 658-669. doi: 10.1007/s10964-009-9441-9
- Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*(3), 411-423.
- Antonovsky, A. (1979). *Health, stress and coping*. San Francisco, CA: Jossey-Bass.
- Antonovsky, A. (1987). *Unraveling the mystery of health. How people manage stress and stay well*. San Francisco, CA: Jossey-Bass.
- Antonovsky, A. (1993). The structure and properties of the sense of coherence scale. *Social Science & Medicine*, *36*, 725-733. doi:10.1016/0277-9536(93)90033-Z
- Barry, C. M., & Wentzel, K. R. (2006). Friend influence on prosocial behavior: The role of motivational factors and friendship characteristics. *Developmental Psychology*, *42*, 153-163. doi: 10.1037/0012-1649.42.1.153
- Bokhorst, C. L., Sumter, S. R., & Westenberg, P. M. (2010). Social support from parents, friends, classmates, and teachers in children and adolescents aged 9 to 18 years: Who is perceived as most supportive? *Social Development*, *19*, 417-426. doi: 10.1111/j.1467-9507.2009.00540.x
- Bornstein, M. H., & Bradley, R. H. (2003) (Eds.). *Socioeconomic Status, Parenting, and Child Development*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Bowlby, J. (1988). *A secure base*. New York, NY: Basic Books.
- Bowen, G., L., Richman, J. M., Brewster, A., & Bowen, N. (1998). Sense of school coherence, perceptions of danger at school, and teacher support among youth at risk of school failure. *Child and Adolescent Social Work Journal*, *15*, 273-286. doi: 10.1023/A:1025159811181
- Brechwald, W. A., & Prinstein, M. J. (2011). Beyond homophily: A decade of advances in understanding peer influence processes. *Journal of Research on Adolescence*, *21*, 166-179. doi:10.1111/j.1532-7795.2010.00721.x
- Brody, G. H., Ge, X., Conger, R., Gibbons, F. X., Murry, V. M., Gerrard, M., & Simons, R. L. (2001). The influence of neighbourhood disadvantage, collective socialization and parenting on African American children's affiliation with deviant peers. *Child Development*, *72*, 1231-1246. doi:10.1111/1467-8624.00344
- Bronfenbrenner, U. (1979). *The ecology of human development: experiments by nature and design*. Cambridge, MA: Harvard University Press.
- Bronfenbrenner, U., & Morris, P. A. (1998). The ecology of developmental processes. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology, Vol. 1: Theoretical models of human development* (5th ed., pp. 993-1023). New York, NY: Wiley.
- Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology, Vol. 1: Theoretical models of human development* (6th ed., pp. 793-828). New York, NY: Wiley

- Brown, B. B. (2004). Adolescents' relationships with peers. In R. M. Lerner, & L. Steinberg (Eds.), *Handbook of adolescent psychology* (2nd ed., pp. 363-394). New Jersey, NJ: John Wiley & Sons.
- Brown, B. B., Mounts, N., Lamborn, S. D., & Steinberg, L. (1993). Parenting practices and peer group affiliation in adolescence. *Child Development, 64*, 467-482. doi: 10.1111/j.1467-8624.1993.tb02922.x
- Burton, L. M., Price-Spratlen, T., & Spencer, M. B. (1997). On ways of thinking about measuring neighborhoods: Implications for studying context and developmental outcomes for children. In J. Brooks-Gunn, G. J. Duncan, & J. L. Aber (Eds.), *Neighborhood Poverty* (Vol. 2, pp. 132-144). New York, NY: Russell Sage Foundation.
- Cantril, H. (1965). *The pattern of human concerns*. New Brunswick, NJ: Rutgers University Press.
- Cheung, G.W., & Rensvold, R.B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*, 233-255. doi: 10.1207/S15328007SEM0902_5
- Damon, W. (2004). What is Positive Youth Development? *The ANNALS of the American Academy of Political and Social Science, 591*, 13-24. doi:10.1177/0002716203260092
- Danielsen, A. G., Samdal, O., Hetland, J., & Wold, B. (2009). School-related social support and students' perceived life satisfaction. *The Journal of Educational Research, 102*, 303-320. doi:10.3200/JOER.102.4.303-320
- Dean, K., & McQueen, D. V. (1996). Theory in health promotion: introduction. *Health Promotion International, 11*, 7-9. doi: 10.1093/heapro/11.1.7
- De Vries, H., Engels, R., Kremers, S., Wetzels, J., & Mudde, A. (2003). Parents' and friends' smoking status as predictors of smoking onset: Findings from six European countries. *Health Education Research, 18*, 627-636. doi: 10.1093/her/cyg032
- Demaray, M. K., & Malecki, C. K. (2003). Importance ratings of socially supportive behaviors by children and adolescents. *School Psychology Review, 32(1)*, 108-131.
- Drevets, R. K., Benton, S. L., & Bradley, F. O. (1996). Students' perceptions of parents' and teachers' qualities of interpersonal relations. *Journal of Youth and Adolescence, 25*, 787-802. doi: 10.1007/BF01537454
- Due, P., Holstein, B. E., Lynch, J., Diderichsen, F., Nic Gabhain, S., Scheidt, P., ... & The Health Behaviour in School-aged Children Bullying working group (2005). Bullying and symptoms among school-aged children: international comparative cross sectional study in 28 countries. *European Journal of Public Health, 15*, 128-132. doi: 10.1093/eurpub/cki105
- Eccles, J. S., & Roeser, R. W. (2011). School as developmental contexts during adolescence. *Journal of Research on Adolescence, 21*, 225-241. doi: 10.1111/j.1532-7795.2010.00725.x
- Eriksson, M., & Lindström, B. (2005). Validity of Antonovsky's sense of coherence scale: a systematic review. *Journal of Epidemiology and Community Health, 59*, 460-466. doi:10.1136/jech.2003.018085
- Eriksson, M., & Lindström, B. (2006). Antonovsky's sense of coherence scale and the relation with health: a systematic review. *Journal of Epidemiology and Community Health, 60*, 376-381. doi:10.1136/jech.2005.041616

- Eriksson, M., & Lindström, B. (2007). Antonovsky's sense of coherence scale and the relation with quality of life: a systematic review. *Journal of Epidemiology and Community Health*, *61*, 938-944. doi:10.1136/jech.2006.056028
- Eriksson, M., & Lindström, B. (2008). A salutogenic interpretation of the Ottawa Charter. *Health Promotion International* *23*, 190-199. doi: 10.1093/heapro/dan014
- Evans, W. P., Marsh, S. C., & Weigel, D. J. (2010) Promoting adolescent sense of coherence: Testing models of risk, protection, and resiliency. *Journal of Community & Applied Social Psychology* *20*, 30-43. doi: 10.1002/casp.1002
- Gådin, K. J., & Hammarström, A. (2003). Do changes in the psychosocial school environment influence pupils' health development? *Scandinavian Journal of Public Health*, *31*, 169-177. doi:10.1080/14034940210134121
- Galambos, N. L., Berenbaum, S. A., & McHale, S. M. (2009). Gender development in adolescence. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of Adolescent Psychology, Vol 1: Individual Bases of Adolescent Development* (3rd ed., pp. 305-357). Hoboken, NJ: John Wiley & Sons.
- García-Moya, I., Moreno, C., & Jiménez-Iglesias, A. (in press). Building a composite factorial score for the assessment of quality of parent-child relationships in adolescence. *European Journal of Developmental Psychology*. Advance online publication. doi:10.1080/17405629.2012.707781
- García-Moya, I., Rivera, F., & Moreno, C. (2013). School context and health in adolescence: The role of sense of coherence. *Scandinavian Journal of Psychology*, *54*, 243-249. doi: 10.1111/sjop.12041
- García-Moya, I., Rivera, F., Moreno, C., Lindström, B., & Jiménez-Iglesias, A. (2012). Analysis of the importance of family in the development of sense of coherence during adolescence. *Scandinavian Journal of Public Health*, *40*, 333-339. doi: 10.1177/1403494812449924
- Gaspar de Matos, M., Van der Sluijs, W., Sánchez-Queija, I., Muñoz-Tinoco, V., Tomé, G., Ferreira, M., Gaspar, T.,... the Peer Culture Focus Group (2009). Social contexts of health and health behaviour: Peer culture. In *HBSC Research Protocol for 2009/10 Survey. Section II Scientific Rationales for focus areas*. Unpublished manuscript.
- Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (2009). *Análisis multivariante*. Madrid, Spain: Pearson, Prentice-Hall.
- Hochwälder, J. (in press). Negative life events and mental ill-health among women: A prospective study of the main, moderating and mediating effect of sense of coherence. *Journal of Happiness Studies*. Advance online publication. doi: 10.1007/s10902-012-9407-6
- Hochwälder, J., & Forsell, Y. (2011). Is sense of coherence lowered by negative life events? *Journal of Happiness Studies*, *12*, 475-492. doi: 10.1007/s10902-010-9211-0
- Honkinen, P.-L., Suominen, S., Rautava, P., Hakanen, J., & Valimo, R. (2006). The adult sense of coherence scale is applicable to 12-year-old schoolchildren—An additional tool in health promotion. *Acta Paediatrica*, *95*, 952-955. doi: 10.1080/08035250600750056
- Hu, L.-T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1-55. doi: 10.1080/10705519909540118

- Hunter, S. C., & Boyle, J. M. E. (2004). Appraisal and coping strategy use in victims of school bullying. *British Journal of Educational Psychology*, *74*, 83-107. doi: 10.1348/000709904322848833
- Jaccard, J., Blanton, H., & Dodge, T. (2005). Peer influences on risk behavior: An analysis of the effects of a close friend. *Developmental Psychology*, *41*, 135-147. doi: 10.1037/0012-1649.41.1.135
- Kawachi, I. (2010). The relationship between health assets, social capital and cohesive communities. In A. Morgan, M. Davies & E. Ziglio (Eds.), *Health Assets in a Global Context* (pp. 167- 182). London, UK: Springer.
- Kawachi, I., Kennedy, B. P., Lochner, K., & Prothrow-Stith, D. (1997). Social Capital, income and inequality. *American Journal of Public Health*, *87*, 1491-98.
- Klimidis, S., Minas, I. H., & Ata, A.W. (1992). The PBI-BC: A brief current form of the parental bonding instrument for adolescent research. *Comprehensive Psychiatry*, *33*, 374-377. doi:10.1016/0010-440X(92)90058-X
- Kline, R. B. (2011). *Principles and practice of structural equation modeling*. New York, NY: The Guilford Press.
- Koposov, R. A., Ruchkin, V. V., & Eisemann, M. (2003). Sense of coherence: a mediator between violence exposure and psychopathology in Russian juvenile delinquents. *Journal of Nervous & Mental Disease*, *191*, 638-644. doi: 10.1097/01.nmd.0000092196.48697.9d
- Laible, D. J., Carlo, G., & Roesch, S. C. (2004). Pathways to self-esteem in late adolescence: the role of parent and peer attachment, empathy, and social behaviours. *Journal of Adolescence*, *27*, 703–716. doi:10.1016/j.adolescence.2004.05.005
- Lakey, B., & Dickinson, L. G. (1994). Antecedents of perceived support: Is perceived family environment generalized to new social relationships? *Cognitive Therapy and Research*, *18*, 34-56. doi: 10.1007/BF02359394
- Laursen, B., & Collins, W. A. (2009). Parent–child relationships during adolescence. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology. Vol. 2: Contextual influences on adolescent development* (3rd ed., pp. 3-42). Hoboken, NJ: John Wiley & Sons.
- Lerner, J. V., Phelps, E., Forman, Y., & Bowers, E. P. (2009). Positive Youth Development. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of Adolescent Psychology. Vol 1: Individual Bases of Adolescent Development* (3rd ed., pp. 524-558). Hoboken, NJ: John Wiley & Sons.
- Leventhal, T., Dupéré, V., & Brooks-Gunn, J. (2009). Neighbourhood influences on adolescent development. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology. Vol. 2: Contextual influences on adolescent development* (3rd ed., pp. 411-443). Hoboken, NJ: John Wiley & Sons.
- Lindström, B., & Eriksson, M. (2010). *The hitchhiker's guide to salutogenesis*. Helsinki, Finland: Folkhälsan Research Center Health Promotion Research.
- Marsh, S. C., Clinkinbeard, S. S., Thomas, R. M., & Evans, W. P. (2007). Risk and protective factors predictive of sense of coherence during adolescence. *Journal of Health Psychology*, *12*, 281-284. doi: 10.1177/1359105307074258

- Masten, S. (2001). Ordinary magic: Resilience processes in development. *American Psychologist*, *56*, 227-238. doi: 10.1037/0003-066X.56.3.227
- McBride, V. M., Berkel, C., Gaylord-Harden, N. K., Copeland-Linder, N., & Nation, M. (2011). Neighbourhood poverty and adolescent development. *Journal of Research on Adolescence*, *21*, 114-128. doi: 10.1111/j.1532-7795.2010.00718.x
- McDonald, R. P., & Ho, M. R. (2002). Principles and practice in reporting structural equation analyses. *Psychological Methods*, *7*, 64-82. doi: 10.1037//1082-989X.7.1.64
- McElhaney, K. B., Allen, J. P., Stephenson, J. C., & Hare, A. L. (2009). Attachment and autonomy during adolescence. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of Adolescent Psychology, Vol 1: Individual Bases of Adolescent Development* (3rd ed., pp. 358-403). Hoboken, NJ: John Wiley & Sons.
- McLellan, L., Rissel, C., Donnelly, N., & Bauman, A. (1999). Health behaviour and the school environment in New South Wales, Australia. *Social Science & Medicine*, *49*, 611-619. doi:10.1016/S0277-9536(99)00136-7
- Moksnes, U. K., Løhre, A., & Espnes, G. A. (in press). The association between sense of coherence and life satisfaction in adolescents. *Quality of Life Research*. Advance online publication. doi: 10.1007/s11136-012-0249-9
- Moksnes, U. K., Rannestad, T., Byrne, D. G., & Espnes, G. A. (2010). The association between stress, sense of coherence and subjective health complaints in adolescents: sense of coherence as a potential moderator. *Stress and Health*, *27*, 157-165. doi: 10.1002/smi.1353
- Morgan, A., & Ziglio, E. (2007). Revitalising the evidence base for public health: an assets model. *Global Health Promotion*, *14*, S17-22. doi:10.1177/10253823070140020701x
- Mounts, N. S. (2002). Parental management of adolescent peer relationships in context: The role of parenting style. *Journal of Family Psychology*, *16*, 58-69. doi: 10.1037//0893-3200.16.1.58.
- Natvig, G. K., Albrektsen, G., & Qvarnstrøm, U. (2003). Associations between psychosocial factors and happiness among school adolescents. *International Journal of Nursing Practice*, *9*, 166-175. doi:10.1046/j.1440-172X.2003.00419.x
- Natvig, G. K., Hanestad, B. R., & Samdal, O. (2006). The role of the student: salutogenic or pathogenic? *International Journal of Nursing Practice*, *12*, 280-287. doi: 10.1111/j.1440-172X.2006.00583.x
- Oliva, A., Antolín, L., Estévez, R., & Pascual, D. (in press). Activos del barrio y ajuste adolescente. *Psychological Intervention*. Advance online publication. doi:10.5093/in2012v21n1a1
- Olsson, M., Hansson, K., Lundblad, A. M., & Cederblad, M. (2006). Sense of coherence: definition and explanation. *International Journal of Social Welfare*, *15*, 219-229. doi: 10.1111/j.1468-2397.2006.00410.x
- Pallant, J. F., & Lae, L. (2002). Sense of coherence, well-being, coping and personality factors: further evaluation of the sense of coherence scale. *Personality and Individual Differences*, *33*, 39-48. doi: 10.1016/S0191-8869(01)00134-9

- Parke, R.D., & Buriel, B. (2006). Socialization in the family: Ethnic and Ecological Perspective. In W. Damon, R. M. Lerner & N. Eisenberg (Eds.), *Handbook of Child Psychology. Vol. 3, Social, Emotional, and Personality Development* (5th ed., pp. 463-552). New York, NY: Wiley.
- Perry, D. G., & Pauletti, R. E. (2011). Gender and adolescent development. *Journal of Research on Adolescence, 21*, 61-74. doi:10.1111/j.1532-7795.2010.00715.x
- Prinstein, M. J., & Dodge, K. A. (2008). *Understanding peer influence in children and adolescents*. New York, NY: Guilford.
- Reddy, R., Rhodes, J. E., & Mulhall, P. (2003). The influence of teacher support on student adjustment in the middle school years: A latent growth curve study. *Development and Psychopathology, 15*, 119-138. doi: 10.1017.S0954579403000075
- Reiss, D. (1981). *The Family's Construction of Reality*. Harvard, MA: Harvard University Press.
- Rivera, F., García-Moya, I., Moreno, C., & Ramos, P. (in press). Developmental contexts and sense of coherence in adolescence: a systematic review. *Journal of Health Psychology*. Advance online publication. doi:10.1177/1359105312455077
- Roberts, C., Freeman, J., Samdal, O., Schnohr, C., de Looze, M. E., Nic Gabhainn, S., ... The International HBSC Study Group (2009). The Health Behaviour in School-aged Children (HBSC) study: methodological developments and current tensions. *International Journal of Public Health, 54*, S140–S150. doi:10.1007/s00038-009-5405-9
- Rubin, K. H., Bukowski, W. M., & Parker, J. G. (2006). Peer interactions, relationships, and groups. In N. Eisenberg (Ed.), *Handbook of child psychology. Vol. 3. Social, emotional and personality development* (6th ed., pp. 619-700). New Jersey, NJ: John Wiley & Sons.
- Sampson, R. J., & Sharkey, P. (2008). Neighbourhood selection and the social reproduction of concentrated racial inequality. *Demography, 45*(1), 1-29.
- Schiffirin, H. H., & Nelson, S. K. (2010). Stressed and Happy? Investigating the relationship between happiness and perceived stress. *Journal of Happiness Studies, 11*, 33-39. doi: 10.1007/s10902-008-9104-7
- Seiffge-Krenke, I. (2011). Coping with relationship stressors: A decade review. *Journal of Research on Adolescence, 21*, 196-210. doi:10.1111/j.1532-7795.2010.00723.x
- Seligman, M. E. P. & Csikszentmihalyi, M. (2000). Positive Psychology. An Introduction. *American Psychologist, 55*, 5-14. doi: 10.1037//0003-066X.55.1.5
- Smetana, J. G., Campione-Barr, N., & Metzger, A. (2006). Adolescent development in interpersonal and societal contexts. *Annual Reviews of Psychology, 57*, 255-284. doi: 10.1146/annurev.psych57.102904.190124
- Steinberg, L. (2002). *Adolescence* (6th ed.). New York, NY: McGraw-Hill.
- Steinberg, L., & Morris, A. S. (2001). Adolescent development. *Annual Review of Psychology, 52*, 83-110. doi: 10.1146/annurev.psych.52.1.83
- Steinberg, L., & Silk, J.S. (2002). Parenting adolescents. In M.H. Bornstein (Ed.), *Handbook of Parenting. Vol.1: Children and parenting* (pp. 103-134). Mahwah, NJ: Lawrence Erlbaum Associates.

- Torsheim, T., Wold, B., & Samdal, O. (2000). The teacher and classmate support scale: factor structure, test-retest reliability and validity in samples of 13- and 15-year old adolescents. *School Psychology International, 21*, 195-212. doi:10.1177/0143034300212006
- Volanen, S-M., Lahelma, E., Silventoinen, K., & Suominen, S. (2004). Factors contributing to sense of coherence among men and women. *European Journal of Public Health, 14*, 322-330. doi: 10.1093/eurpub/14.3.322
- Werner, N. E., & Silbereisen, R. K. (2003). Family relationship quality and contact with deviant peers as predictors of adolescent problem behaviors: the moderating role of gender. *Journal of Adolescent Research, 18*, 454-480. doi: 10.1177/0743558403255063
- Werner, E., & Smith, R. (1992). *Overcoming the odds: High risk children from birth to adulthood*. Ithaca, NY: Cornell University Press.
- Wiesmann, U., & Hannich, H-J. (2010). A salutogenic analysis of healthy aging in active elderly persons. *Research on Aging, 32*, 349-371. doi: 10.1177/0164027509356954
- Wiesmann, U., & Hannich, H-J. (in press). The contribution of resistance resources and sense of coherence to life satisfaction in older age. *Journal of Happiness Studies*. Advance online publication. doi: 10.1007/s10902-012-9361-3
- Windle, M. (2000). Parental, sibling, and peer influences on adolescent substance use and alcohol problems. *Applied Developmental Science, 4*, 98-110. doi:10.1207/S1532480XADS0402_5

Table 1

Goodness-of-fit indices for the tested nested models

Goodness-of-fit indices	Model 1	Model 2	Model 2b
χ^2	3236.528	2579.516	2212.365
<i>p</i>	<.001	<.001	<.001
<i>df</i>	247	245	244
χ^2 -difference	-	657.012	367.151
<i>df</i> -difference	-	2	1
<i>p</i>	-	<.001	<.001
<i>NNFI</i>	.904	.925	.937
<i>CFI</i>	.914	.933	.944
<i>RMSEA</i> (90% CI)	.046 (.045, .048)	.041(.040,.043)	.038 (.036,.039)
<i>SRMR</i>	.110	.091	.069

Note: Model 2b = Modified Model 2 in which a covariance was included between the quality of parent-child relationships and neighborhood factors drawing on the LM Test results and theoretical relevance.

Table 2

Decomposition for effects of exogenous and endogenous variables on SOC

	Direct effect	Indirect effects	Total effect
CS	.144	--	.144
TS	.100	--	.100
N	.150	--	.150
F	.367	via TS = .038 via P = .075	.480
P	.241	--	.241

Note: CS= Classmate support; F= Quality of parent-child relationships; N= Neighborhood assets; P= Models of behavior in the peer group; TS= Teacher support

Table 3

LM Test for testing equality constraints in path coefficients across groups

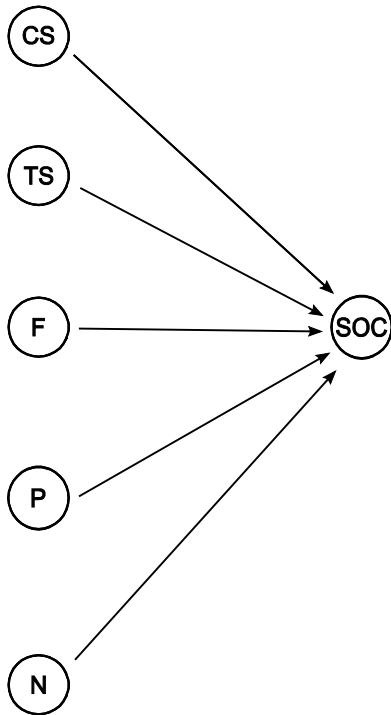
Hypothesis	df	$\Delta\chi^2$	<i>p</i>
0. Equality in path coefficients across groups			
1.Release of TS -> SOC	1	5.471	.019
2.Release of F -> TS	2	4.867	.027
3.Release of F-> P	3	3.811	ns
4.Release of CS -> SOC	4	3.050	ns
5.Release of F-> SOC	5	0.274	ns
6.Release of P-> SOC	6	0.099	ns
7.Release of N-> SOC	7	0.059	ns

Note: CS= Classmate support; F= Quality of parent-child relationships; N= Neighborhood assets; P= Models of behavior in the peer group; TS= Teacher support; ns= non-significant at the .05 level

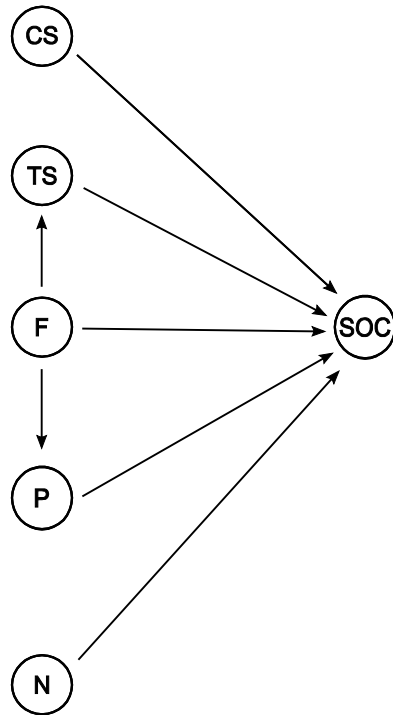
Figures

Fig. 1 The hypothesized models

Model 1

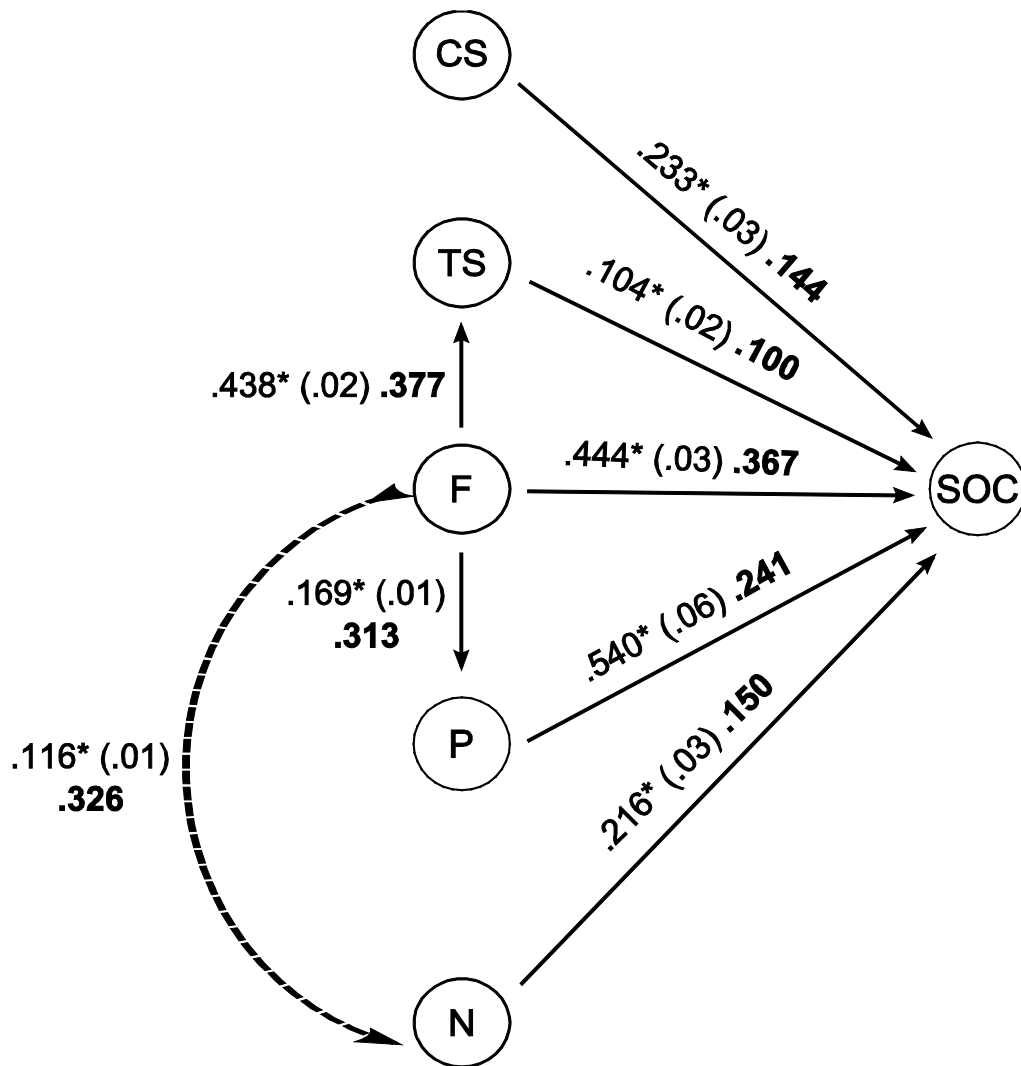


Model 2



Note: CS= Classmate support; F= Quality of parent-child relationships; N= Neighborhood assets; P= Models of behavior in the peer group; TS= Teacher support

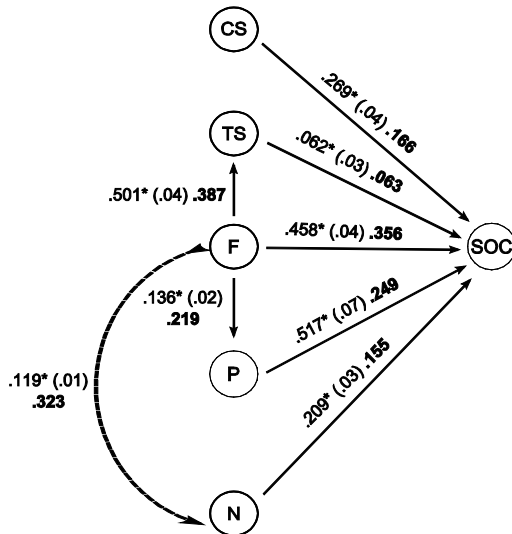
Fig. 2 Path coefficient estimates of the final model



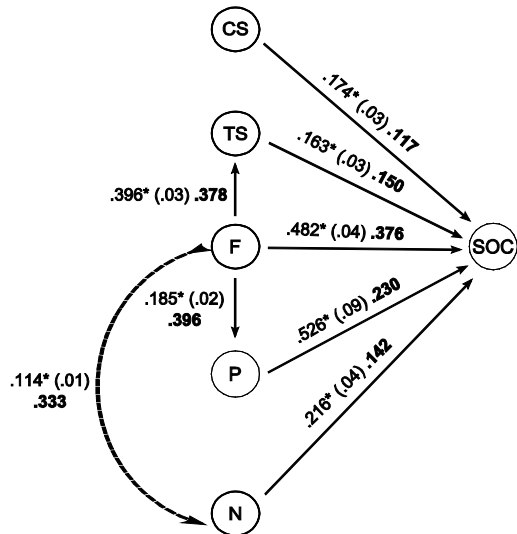
Note: SE is indicated between parentheses after the unstandardized coefficient and the standardized coefficients appear in bold. CS= Classmate support; F= Quality of parent-child relationships; N= Neighborhood assets; P= Models of behavior in the peer group; TS= Teacher support
 * $p < .05$

Fig. 3 Path coefficient estimates of the final model in boys and girls

BOYS



GIRLS



Note: SE is indicated between parentheses after the unstandardized coefficient and the standardized coefficients appear in bold.
 CS= Classmate support; F=Quality of parent-child relationships; N= Neighborhood assets; P= Models of behavior in the peer group;
 TS= Teacher support.
 * $p < .05$