ORIGINAL ARTICLE

Connectedness as a protective factor in immigrant youth: results from the Health Behaviours in School-aged Children (HBSC) Italian study

Alberto Borraccino[1] · Paola Berchialla[2] · Paola Dalmasso[1] · Veronica Sciannameo[1] · Alessio Vieno[4] ·
Giacomo Lazzeri[3] · Lorena Charrier[1] · Patrizia Lemma[1]

Abstract

Objectives The aim of this work was to study whether and to what extent selected connectedness variables (perceived family, peer, and school support) are protective factors against low life satisfaction and high health complaints in immigrant youth with different ethnic backgrounds, while also taking into account the effect of socioeconomic status (SES).

Methods A representative sample of 47,799 students (15% immigrants, among whom 4980 were from non-Western countries) aged 11, 13, and 15 years were recruited from schools throughout Italy within the framework of the Italian 2013/2014 Health Behaviour in School-aged Children study. Bayesian network analyses were used to assess the association between connectedness variables, and low life satisfaction and high health complaints.

Results The connectedness variables family and school support were strong protective factors against both low life satisfaction and high health complaints (99% probability of relative risk < 1 in all subgroup comparisons). This protective role was still present when subgroups with high SES were compared. Peer support also showed a protective effect, though it was weaker.

Conclusions Our results show that, among immigrant youth, perceived high support can act as a moderator on the effect of environmental stressors. In line with international guidelines, these results confirm that public health professionals should create school interventions that foster a culture of inclusiveness, promote a supportive school environment, and engage families of immigrant youth.

Keywords Connectedness · Adolescent immigrants · Perceived well-being · HBSC · Life satisfaction · Health complaint

✉ Alberto Borraccino
alberto.borraccino@unito.it

Paola Berchialla
paola.berchialla@unito.it

Paola Dalmasso
paola.dalmasso@unito.it

Veronica Sciannameo
veronica.sciannameo@unito.it

Alessio Vieno
alessio.vieno@unipd.it

Giacomo Lazzeri
giacomo.lazzeri@unisi.it

Lorena Charrier
lorena.charrier@unito.it

Patrizia Lemma
patrizia.lemma@unito.it

[1] Department of Public Health and Paediatrics, University of Torino, Piazza Polonia, 94, 10126 Turin, Italy

[2] Department of Clinical and Biological Sciences, University of Torino, Turin, Italy

[3] Department of Molecular and Developmental Medicine, University of Siena, Siena, Italy

[4] Department of Developmental and Social Psychology, University of Padova, Padua, Italy

🍦 Springer

Introduction

The majority of young people in developed countries grow up healthy and safe, receiving the assistance they need during the transition from adolescence to adulthood from their families and their community. However, some youth face environmental stressors, such as barriers or life events, that put them at risk of developing a dissatisfaction with life that can lead to negative health outcomes, making them a vulnerable part of the youth population (Fernandes-Alcantara 2018). Vulnerable youth have been described as individuals "who, through a combination of their circumstances, stage of development and barriers to participation, are at risk of not realising their potential to achieve positive life outcomes" (Victorian Government, Department of Human Services 2010). Although the concept of vulnerability has been widely discussed in the recent literature (Vieno et al. 2009; Kouider et al. 2014; Mood et al. 2016), agreement on which factors could potentially protect or act as a buffer against environmental stressors is still poor (Foster et al. 2017).

Economic barriers and belonging to an ethnic minority group due to immigration have been cited as two known conditions of vulnerability in youth (Fernandes-Alcantara 2018).

In the recent Italian context, two different immigration patterns have been identified: a Western countries pattern, and an Eastern European and non-Western non-European countries pattern (Dalmasso et al. 2018). When studied, the differences that emerged between the immigrant youth involved in these patterns and their Italian peers were greatest in the domains of life satisfaction and health complaints. Indeed, adolescent immigrants from the Eastern European and non-Western non-European countries pattern reported low life satisfaction and high health complaints far more frequently than their Western and Italian counterparts. These differences remained even after variations in socioeconomic status (SES) were taken into account. Given these results, immigrant youth coming from Eastern European and non-Western non-European countries can be considered at risk of vulnerability, and policies that reinforce known protective factors should be tailored to this group (Borraccino et al. 2018).

Among known protective factors, connectedness, defined as the degree to which individuals or groups are socially close, showed the greatest potential (Centers for Disease Control and Prevention 2009; Foster et al. 2017). A supportive family, the presence of a peer network, and a positive school environment have indeed been positively associated with lower levels of stress and depression in youth (Resnick et al. 1997; Karvonen et al. 2005; Lemma et al. 2015). Additionally, results of a meta-analysis showed a significant, positive association between connectedness and positive health outcomes in adolescents; the same study also revealed that the support of teachers and school personnel had a greater impact than the support of family or peers (Chu et al. 2010). However, few studies have focused on specific subgroups at risk of vulnerability, and according to Foster et al. (2017) and colleagues, more research is needed to reveal whether social support in particular contexts (family, peers, school, or community) might be helpful.

The aim of this work was to study whether and to what extent selected connectedness variables (perceived family, peer, and school support) are protective factors against low life satisfaction and high health complaints in immigrant youth with different ethnic backgrounds, while also taking into account the effect of SES.

Methods

Study population and design

Data were collected as part of the 2013/14 Health Behaviour in School-aged Children (HBSC) study in Italy. The HBSC is a World Health Organization Collaborative Cross-National Survey which runs every 4 years in participating countries. In 2014, it included 43 nations across and outside Europe. To ensure consistency in the survey, all participating countries adhered to the HBSC international study protocol informing instruments; participants' consent procedures, anonymity, and confidentiality; as well data collection and processing (Currie et al. 2014; HBSC International Group 2018). The Italian HBSC study protocol and questionnaire were also formally approved by the Bioethics Committee of the University of Torino.

School class is the primary sampling unit in the Italian HBSC. The Italian sample was drawn from an official list of all public and private schools obtained from the Ministry of Education through systematic cluster sampling. This yielded a total of 3681 school classes located throughout all Italian regions, all of which were invited to participate. Of the classes invited, 3315 agreed to participate (response rate 90.1%); this included 47,799 11-, 13-, and 15-year-old students. Among these, an absolute number of 400 students had missing data on ethnic background and were excluded. Thus, the final analytical sample consisted of 47,399 students.

Variables and measures

Ethnic background

Ethnic background was defined as the mother's country of birth. If she was born in Italy or the information was missing, father's country of birth was used. The immigrant youth population included in these analyses is identical to that used in two previous works (Borraccino et al. 2018; Dalmasso et al. 2018). Given the aim of the present study, the sample was stratified into three main groups:

- The Host group ($n = 40{,}224$), which consisted of all youth born in Italy who had Italian parents.
- The Western group, which consisted of immigrant youth from Western countries, i.e. EU-15 and other Western countries (Switzerland, Norway, Iceland, the USA, Canada, Australia, and New Zealand) (Eurostat 2018) ($n = 2195$).
- The Eastern European/non-Western and non-European (EE/nW-nE) group, which consisted of immigrant youth from Eastern European countries, i.e. EU-13 countries (new member states joining the EU after May 2004), plus Albania, Bosnia, Macedonia, Moldavia, Serbia, and Ukraine (Eurostat 2018) ($n = 2424$) and from non-Western and non-European countries, i.e. countries in Africa, South or Central America, and Asia ($n = 2556$). As immigrant youth from EE/nW-nE countries have been shown to have similar distribution patterns of low life satisfaction, high health complaints (Borraccino et al. 2018), and perceived family, peer, and school support (Dalmasso et al. 2018), they were combined into a single group.

Socioeconomic status

SES was measured according to the Family Affluence Scale (FAS), a six-item scale that is a reliable, validated indicator of family wealth (family car ownership, whether adolescents have their own bedroom, number of holiday trips taken in the last year, number of computers owned by the family, dishwasher ownership, and number of bathrooms in the home) (Torsheim et al. 2016). The obtained score (0–13) was recorded on a three-point ordinal scale and categorised as low (0–6), medium (7–9), and high (≥ 10) FAS, and then dichotomised into low (0–6) and medium/high FAS (7–13) (Inchley et al. 2016).

Perceived family and peer support

Family and peer support were each measured using a multidimensional scale consisting of four items. For family support, the items were: (a) "My family really tries to help me", (b) "I get the emotional help and support I need from my family", (c) "I can talk about my problems to my family", and (d) "My family is willing to help me make decisions" (Zimet et al. 1988). For peer support, the items were: (a) "My friends really try to help me", (b) "I can count on my friends when things go wrong", (c) "I have friends with whom I can share my joys and sorrows", and (d) "I can talk about my problems with my friends" (Zimet et al. 1990). Response options for family and peer support ranged from very strongly disagree (1) to very strongly agree (7); a sum-score was then calculated (range 4–28) and divided by four.

Participants with missing data in one or more items were excluded from that scale (Torsheim and Wold 2001). Both scales were then dichotomised into low (< 5.5) or high (≥ 5.5) support (Zimet et al. 1990; Canty-Mitchell and Zimet 2000; Inchley et al. 2016). The multidimensional scales of perceived family and peer support have shown good validity and reliability (Zimet et al. 1988, 1990). Cronbach's alpha values for family and peer support in the current study were 0.80 and 0.87, respectively.

Perceived school support

Three different, multidimensional scales were used to measure school support: teacher support, classmate support, and the sense of belonging scale. Teacher support was measured by three items: (a) "I feel that my teachers accept me as I am", (b) "I feel that my teachers care about me as a person", and (c) "I feel a lot of trust in my teachers" (Torsheim et al. 2000). Cronbach's alpha for teacher support was 0.74. Classmate support was also measured by three items: (a) "The students in my class enjoy being together", (b) "Most of the students in my class are kind and helpful", and (c) "Other students accept me as I am" (Torsheim et al. 2000). Cronbach's alpha for classmate support was 0.74. Finally, sense of belonging was measured by two items: (a) "I feel I belong at this school" and (b) "Our school is a nice place to be" (Vieno et al. 2007). Cronbach's alpha for sense of belonging was 0.71.

Response categories for all the three scales ranged from strongly agree (1) to strongly disagree (5). Original codes were reversed: strongly disagree (0) to strongly agree (4), a sum-score was generated for each scale (range 0–12 for the teacher and classmate support scale and 0–8 for the sense of belonging scale), divided by three and by two, respectively, and lastly combined. The resulting median score was then categorised as low (< 2.5) or high (≥ 2.5) school support (Torsheim et al. 2000; Vieno et al. 2007). Cronbach's alpha for the school support variable, as used in the current study, was 0.80.

Outcomes

Life satisfaction

Life satisfaction was assessed by the Cantril-ladder (Cantril 1965). Respondents were asked to indicate where on the ladder they would say they were at that moment, with the bottom of the ladder (0) representing the worst way of living, and the top (10) indicating the best possible way of living. Findings were dichotomised as low (0–5) and high life satisfaction (≥ 6) (Levin and Currie 2014).

Health complaints

Health complaints were assessed through an eight-item checklist (Haugland and Wold 2001)that recorded how often participants had experienced the following eight symptoms in the past 6 months: stomach ache, headache, backache, feeling low, irritability or bad temper, feeling nervous, difficulties in getting to sleep, and feeling dizzy. Responses were given on a five-point scale: rarely or never (0), about every month (1), about every week (2), more than once a week (3), and about every day (4). A summary continuous scale of health complaints (range 0–32) was then dichotomised using the median value (low health complaints < 16; high health complaints ≥ 16) (Ravens-Sieberer et al. 2004).

Data analyses

Descriptive data are shown as absolute and relative (%) frequencies for categorical variables. The Chi-square test was performed to evaluate the comparisons among the ethnic groups (the EE/nW-nE group, the Western group, and the Host group) and each of the characteristics of the sample (gender, age, and SES), the connectedness variables (family, peer, and school support) and outcomes (low life satisfaction and high health complaints). A statistical significance level of 5% was used.

Bayesian network

When prior knowledge on the domain under study is lacking and there is a large amount of data available, Bayesian network (BN) analysis has been suggested as the most suitable approach to study probabilistic systems dealing with uncertainty (Pearl 1988; Jensen 2001). Given the complexity embedded in the relationships between our outcomes, connectedness variables, SES, and ethnic background, a BN analysis approach was chosen as the most suitable.

A BN provides a multivariate statistical analysis based on probabilistic graphical models (Koller and Friedman 2009). The structure of BNs takes the form of a directed acyclic graph (DAG), in which each variable is represented by a node, and the relationship between nodes is represented by directed edges (in figure arrows). The network structure induces a set of probability distributions between the nodes that are connected by the arrows. The network structure of nodes and arrows along with the encoded probability distributions defines a BN (Lauritzen and Jensen 2001). For a more comprehensive description, see Lemma et al. (2015).

The learning algorithm *bnlearn*, part of the R package (Scutari 2017), was used to learn the BN from the categorical data and to determine both the DAG, i.e. the set of nodes and arrows between variables (structure learning), and the probability distributions (parameter learning). The PC-stable algorithm with a 100-fold bootstrap was used in the structure learning process to learn the DAG (Colombo and Maathuis 2014). PC-stable is a constraint-based learning algorithm, which uses mutual information tests to estimate whether the conditional independence between variables holds. The 100 DAG learned were then averaged to obtain a more robust model. The averaged DAG was created using the arcs present in at least 90% of the DAGs. This proportion measures the strength of the relationship between two variables (nodes). The final BN appeared to be robust for our choice of significant threshold, since values between 0.8 and 0.95 yielded basically the same results. Finally, a maximum a posteriori estimation was used to compute the set of parameters of the probability distributions at each node. The learning algorithms did not use prior knowledge or constraints.

Based on the final BN, a junction tree algorithm was used to infer the probability of our outcomes (low life satisfaction and high health complaints) after observing the evidence (connectedness variables, ethnic background, and SES). The obtained probabilities were reported as relative risk (RR) and 95% credibility interval (CI). The probability that the RR was smaller than 1, which indicates the strength of the association, is also reported. All analyses were carried out using R version 3.5.0 (R Core Team 2016).

Results

Adolescents in the EE/nW-nE group were significantly more likely to have low SES when compared to adolescents in the Host and Western groups. The EE/nW-nE group also showed lower family, peer, and school support; higher health complaints; and had the lowest life

Table 1 Distribution of characteristics, sources of connectedness, and health outcomes in the study sample according to ethnic background. Health Behaviour in School-aged Children (HBSC) Italy, wave 2013/2014

	EE/nW-nE (n = 4980) n (%)	Western (n = 2195) n (%)	Host (n = 40,224) n (%)	P value
Gender				
Male	2485 (49.9)	1050 (47.8)	20,140 (50.1)	0.125
Age				
11 years	2182 (43.8)	765 (34.9)	14,689 (36.5)	< 0.001
13 years	1693 (34.0)	755 (34.4)	13,806 (34.3)	
15 years	1105 (22.2)	675 (30.8)	11,729 (29.2)	
SES				
Low	2016 (42.1)	505 (23.5)	10,418 (26.5)	< 0.001
Medium	2002 (41.8)	999 (46.6)	19,565 (49.8)	
High	776 (16.2)	642 (29.9)	9291 (23.7)	
Health outcomes				
Low life satisfaction	1028 (20.9)	334 (15.3)	5552 (13.9)	< 0.001
High health complaints	1194 (24.4)	524 (24.2)	8441 (21.2)	< 0.001
Connectedness				
High family support	3404 (70.9)	1665 (77.9)	31,522 (80.4)	< 0.001
High school support	3225 (68.6)	1470 (70.0)	28,436 (73.7)	< 0.001
High peer support	3208 (66.7)	1555 (73.3)	28,332 (74.4)	< 0.001

EE/nW-nE Eastern European/non-European non-Western group: adolescent immigrants from EU-13 countries (new member states joining the EU after May 2004), plus Albania, Bosnia, Macedonia, Moldavia, Serbia, Ukraine, as well as Africa, South or Central America, and Asia; Western: adolescents from EU-15 countries and other Western countries (Switzerland, Norway, Iceland and USA, Canada, Australia, and New Zealand)

SES socioeconomic status

P value for the comparisons among groups for each variable considered

satisfaction (Table 1). Further details can be found elsewhere (Borraccino et al. 2018; Dalmasso et al. 2018).

BNs are depicted in Fig. 1. Nodes represent our demographic, connectedness, SES, and outcome variables, and the arrows represent the direction of the influence between
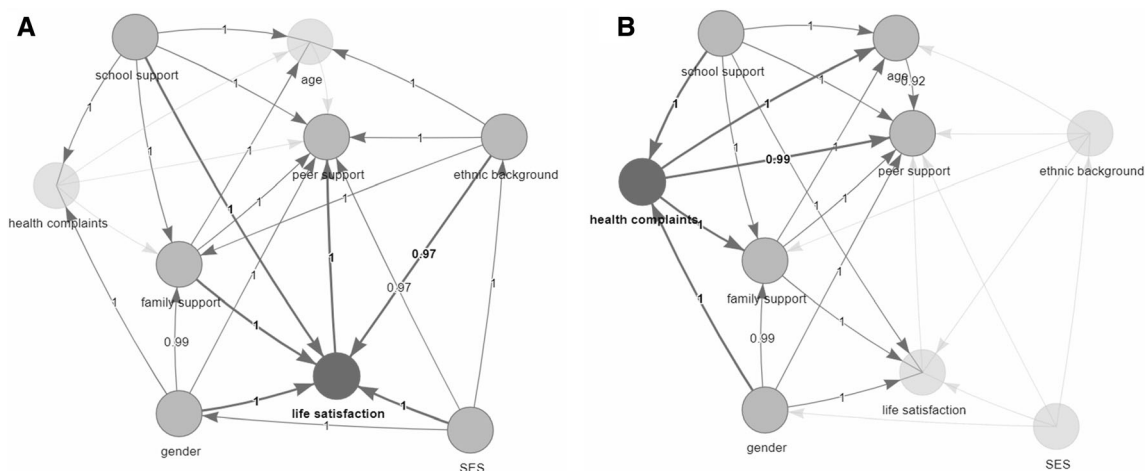

Fig. 1 Graphical representation of the Bayesian networks. Health Behaviour in School-aged Children (HBSC) Italy, wave 2013/2014. Darker nodes represent the outcome of interest: with life satisfaction (**a**) and health complaints (**b**). Other nodes are demographic and connectedness variables, socioeconomic status. Variables that are not directly linked to the outcome of interest are represented with light-grey nodes. Numbers indicated the strength of the association between nodes, from 0 to 1 (the higher the value the stronger the relationship)

the nodes. Dark-grey nodes represent the outcomes: life satisfaction (a) and health complaints (b). Variables directly related to the outcomes are shown in a mid-tone grey, along with the strength of their association (from 0 to 1, the higher the value the stronger the association). Finally, light-grey nodes represent variables indirectly related to the outcomes under study, on which, however, they exert an effect mediated by other variables.

The RR of reporting low life satisfaction (Table 2) and high health complaints (Table 3) was computed by comparing the effect of having low SES and high support in the EE/nW-nE and Western groups, respectively, versus: having low SES and low support (1) and having medium/high SES and low support (2) within these same respective groups (EE/nW-nE group and Western group); and versus having low SES and low support (3) and having medium/high SES and low support (4) in the Host group. High family, peer, and school support showed a positive effect on both low life satisfaction and high health complaints in all comparisons.

Specifically, family and school support had the strongest effect on both low life satisfaction and high health complaints in all comparisons (99% probability of RR < 1). In particular, in the EE/nW-nE group with low SES, high family support reduced the risk of low life satisfaction by about 67% (RR = 0.33, with 99% probability of a RR < 1) and the risk of reporting high health complaints by about 59% (RR = 0.41, with 99% probability of a RR < 1). Similar effects were observed when the EE/nW-nE group was compared to the Host group with low SES (RR = 0.37, with 99% probability of a RR < 1 for low life satisfaction, Table 2, and RR = 0.40, with 99% probability of a RR < 1 for high health complaints, Table 3).

Tables 2 and 3 also show the results of the same analyses for the Western group with low SES: high family support reduced the risk of low life satisfaction by about 74% (RR = 0.26 with 99% probability of a RR < 1) and the risk of high health complaints by about 64% (RR = 0.36, with 99% probability of a RR < 1). Again, similar effects were observed when the Western group was compared to the Host group (RR = 0.30 for low life satisfaction and RR = 0.41 for high health complaints, both with 99% probability of a RR < 1).

Although it was slightly reduced, the protective effect of high family support was still evident in the comparisons of groups with medium–high SES. More precisely, high family support shifted the RR for low life satisfaction from 0.33 to 0.41 when comparing immigrant youth with low SES to those with medium–high SES in the EE/nW-nE group, and from 0.37 to 0.47 when using the Host group as a reference (Table 2). In the Western group, the RR for high family support shifted from 0.26 to 0.35, and from 0.30 to 0.38, respectively. This was also observed for high

Table 2 Relative risks (RR) and 95% credibility intervals (CI) of perceiving low life satisfaction in the Eastern European/non-European non-Western (EE/nW-nE) and in the Western group with low socioeconomic status (SES) and high support versus the EE/nW-nE and the Western group with low or medium/high SES and versus the host counterpart with low SES and low support and with medium–high SES and low support. Health Behaviour in School-aged Children (HBSC) Italy, wave 2013/2014

Low SES and high support		Low SES and low support		Medium–high SES and low support		Low SES and low support		Medium–high SES and low support	
	versus	RR (95% CI)	P (RR < 1)	RR (95% CI)	P (RR < 1)	RR (95% CI)	P (RR < 1)	RR (95% CI)	P (RR < 1)
EE/nW-nE group		EE/nW-nE group				Host			
Family		0.33 (0.25; 0.44)	0.999	0.41 (0.30; 0.55)	0.999	0.37 (0.28; 0.46)	0.999	0.47 (0.36; 0.58)	0.999
School		0.35 (0.26; 0.46)	0.999	0.43 (0.32; 0.57)	0.999	0.43 (0.33; 0.54)	0.999	0.55 (0.43; 0.68)	0.999
Peer		0.65 (0.48; 0.88)	0.999	0.77 (0.57; 1.03)	0.961	0.69 (0.55; 0.86)	0.999	0.86 (0.68; 1.06)	0.915
Western group		Western group				Host			
Family		0.26 (0.13; 0.50)	0.999	0.35 (0.19; 0.60)	0.999	0.30 (0.16; 0.46)	0.999	0.38 (0.21; 0.59)	0.999
School		0.32 (0.16; 0.60)	0.999	0.45 (0.23; 0.76)	0.999	0.34 (0.18; 0.53)	0.999	0.44 (0.23; 0.67)	0.999
Peer		0.45 (0.24; 0.90)	0.988	0.55 (0.30; 0.94)	0.986	0.52 (0.30; 0.79)	0.999	0.64 (0.37; 0.97)	0.981

Western group: adolescents from the host country, EU-15 countries, and other Western countries (Switzerland, Norway, Iceland and USA, Canada, Australia, and New Zealand)

EE/nW-nE: Eastern European/non-European non-Western group, adolescent immigrants from EU-13 countries (new member states joining the EU after May 2004), plus Albania, Bosnia, Macedonia, Moldavia, Serbia, Ukraine, as well as Africa, South or Central America, and Asia

RR relative risks and 95% credibility interval (CI); P (RR < 1) probability that the RR is smaller than 1

Table 3 Relative risks (RR) and 95% credibility intervals (CI) of high health complaints in the Eastern European/non-European non-Western (EE/nW-nE) and in the Western group with low socioeconomic status (SES) and high support versus the EE/nW-nE and the Western group with low or medium/high SES and versus the host counterpart with low SES and low support and with medium–high SES and low support. Health Behaviour in School-aged Children (HBSC) Italy, wave 2013/2014

Low SES and high support		Low SES and low support		Medium–high SES and low support		Low SES and low support		Medium–high SES and low support	
	versus	RR (95% CI)	P (RR < 1)	RR (95% CI)	P (RR < 1)	RR (95% CI)	P (RR < 1)	RR (95% CI)	P (RR < 1)
EE/nW-nE group	versus	EE/nW-nE group				Host			
Family		0.41 (0.31; 0.54)	0.999	0.43 (0.32; 0.55)	0.999	0.40 (0.31; 0.49)	0.999	0.41 (0.32; 0.50)	0.999
School		0.47 (0.36; 0.63)	0.999	0.50 (0.38; 0.64)	0.999	0.48 (0.38; 0.58)	0.999	0.49 (0.39; 0.59)	0.999
Peer		0.76 (0.57; 1.03)	0.961	0.73 (0.55; 0.95)	0.988	0.74 (0.59; 0.90)	0.998	0.74 (0.60; 0.89)	0.999
Western group	versus	Western group				Host			
Family		0.36 (0.20; 0.61)	0.999	0.38 (0.23; 0.58)	0.999	0.41 (0.25; 0.59)	0.999	0.42 (0.26; 0.60)	0.999
School		0.47 (0.27; 0.82)	0.995	0.51 (0.30; 0.77)	0.999	0.49 (0.31; 0.70)	0.999	0.50 (0.32; 0.71)	0.999
Peer		0.76 (0.43; 1.48)	0.808	0.68 (0.43; 1.03)	0.963	0.76 (0.50; 1.06)	0.944	0.77 (0.51; 1.05)	0.944

Western group: adolescents from the host country, EU-15 countries, and other Western countries (Switzerland, Norway, Iceland and USA, Canada, Australia, and New Zealand)

EE/nW-nE: Eastern European/non-European non-Western group, adolescent immigrants from EU-13 countries (new member states joining the EU after May 2004), plus Albania, Bosnia, Macedonia, Moldavia, Serbia, Ukraine, as well as Africa, South or Central America, and Asia

RR relative risks and 95% credibility interval (CI); P (RR < 1) probability that the RR is smaller than 1

school support. Peer support also showed a protective effect in immigrant youth with medium/high SES, but it was weaker (RR = 0.77, 95% CI 0.57–1.03 for the EE/nW-nE group, Table 2; RR = 0.68, 95% CI 0.43–1.03 for the Western group, Table 3).

Discussion

Studies conducted in the general population have looked at the positive role that different sources of support can have on individual psychosocial stress and perceived well-being (Oppedal et al. 2004; Chu et al. 2010). Some authors underlined the need to increase available knowledge on the effect of social support in specific vulnerable communities (Foster et al. 2017), and only a few recent investigations have explored this issue in immigrants, in particular in the adolescent population (Hernandez-Plaza et al. 2005; Walsh et al. 2010; Runarsdottir and Vilhjalmsson 2015; Burholt et al. 2018; du Plooy et al. 2019).

Two hypotheses have been proposed to explain the function of social support: the "main effect" hypothesis and the "indirect" hypothesis (Cohen and Wills 1985). The "main effect" hypothesis says that social resources have a direct impact on individual well-being, independent of the situation or environmental stressors. The "indirect" hypothesis looks at social support as a buffer against the effect of stressful life events. It suggests that, when facing difficulties, adolescents who feel that they are supported will be less likely to face negative health outcomes. Our results seem to support the indirect hypothesis, as the subsample of adolescents with two conditions that can increase the risk of vulnerability, being an immigrant and having low SES (Fernandes-Alcantara 2018), showed the lowest likelihood of reporting low life satisfaction and high health complaints when high support was reported. Social resources did indeed have a moderating role on the effect of environmental stressors.

According to Runarsdottir and Vilhjalmsson (2015), social support plays an important role in adolescent well-being and has the greatest potential to help those adolescents face challenging social, environmental, and economic circumstances; the same was shown for school support in Walsh et al. (2010). All the aforementioned findings were based on HBSC data from different years and countries and pointed to the central role of the school environment in favouring adolescent well-being and immigrant youth development through positive integration. School is the arena in which immigrant youth become part of the host country and develop a sense of belonging in the new society; qualitative studies have shown that connectedness in the school environment has a central, positive role (Camara et al. 2017).

The finding that connectedness is positively linked to less negative health outcomes in immigrant youth should encourage public health professionals to develop tailored, dedicated interventions for this audience (Foster et al. 2017). According to UNICEF (2016), the process of countering inequality and vulnerability, particularly among immigrant youth, should start at school. Using a broader health promotion perspective, teachers' roles and tasks can be reoriented to foster inclusion and connectedness.

In agreement with our findings, and in accordance with international guidelines (Centers for Disease Control and Prevention 2009), interventions held in school settings should strive to foster a culture of inclusiveness by (1) increasing the school's connection with the families of immigrant youth (Rogers-Sirin et al. 2014); (2) formalising activities aimed at promoting a sense of belonging to a supportive society, rather than only structuring a formal curriculum; (3) allowing the formalisation of programmes that support positive ethnic identity development and enhance youth' abilities to function effectively in multiple cultural contexts (bicultural self-efficacy) (Phinney et al. 2001); and (4) giving the proper training and professional support to school teachers and staff (Centers for Disease Control and Prevention 2009).

Our results should be considered in the light of the study's limitations and strengths. Above all, the HBSC study is a cross-sectional study; thus, it does not allow us to draw conclusions about causation. Moreover, as previously documented (Johnson et al. 2005), part of the observed differences between immigrant youth and their Western counterparts may be due to a systematic difference in reporting that is attributable to the relationship between the respondent's culture and possible, related, inherent biases. However, a high cross-cultural validity of self-reported variables has been extensively documented in previous reviews (Paalman et al. 2013; Allen et al. 2016). Accordingly, the observed difference in perceived life satisfaction and reported health complaints shown in our results is plausible. Moreover, our results are limited to the adolescent population in Italy (only one among the nearly 50 countries participating in the HBSC) and to a restricted age range (11–15 years old), thus limiting the generalisability of our findings. Finally, due to the study characteristics, it was not possible to stratify or discuss the different reasons for immigration (i.e. economic, political immigration, refugee) or length of stay. Among the main strengths, this study was based on one of the largest samples of individuals at these developmental ages available in a single country, and it is based on a robust, well-consolidated survey design (Dalmasso et al. 2018).

Given the above limitations and strengths, our results further reinforce the role of connectedness in protecting adolescents, particularly those at high risk of vulnerability due to their immigration background or low SES. Indeed, our results confirm that public health professionals should place a high priority on the creation of school interventions that foster a culture of inclusiveness, promote a supportive school environment, and engage families immigrant youth.

Compliance with ethical standards

References

Allen CD, McNeely CA, Orme JG (2016) Self-rated health across race, ethnicity, and immigration status for US adolescents and young adults. J Adolesc Health 58:47–56

Borraccino A, Charrier L, Berchialla P et al (2018) Perceived well-being in adolescent immigrants: it matters where they come from. Int J Public Health 63:1037–1045. https://doi.org/10.1007/s00038-018-1165-8

Burholt V, Dobbs C, Victor C (2018) Social support networks of older migrants in England and Wales: the role of collectivist culture. Ageing Soc 38:1453–1477. https://doi.org/10.1017/S0144686X17000034

Camara M, Bacigalupe G, Padilla P (2017) The role of social support in adolescents: are you helping me or stressing me out? Int J Adolesc Youth 22:123–136. https://doi.org/10.1080/02673843.2013.875480

Cantril H (1965) The pattern of human concerns. Rutgers University Press, New Brunswick

Canty-Mitchell J, Zimet GD (2000) Psychometric properties of the multidimensional scale of perceived social support in urban adolescents. Am J Community Psychol 28:391–400

Centers for Disease Control and Prevention (2009) School connectedness: strategies for increasing protective factors among youth. https://www.cdc.gov/healthyyouth/protective/pdf/connectedness.pdf. Accessed 3 Feb 2020

Chu PS, Saucier DA, Hafner E (2010) Meta-analysis of the relationships between social support and well-being in children and adolescents. J Soc Clin Psychol 29:624–645

Cohen S, Wills TA (1985) Stress, social support, and the buffering hypothesis. Psychol Bull 98:310

Colombo D, Maathuis MH (2014) Order-independent constraint-based causal structure learning. J Mach Learn Res 15:3741–3782

Currie C, Inchley J, Molcho M et al (2014) Health Behaviour in School-aged Children (HBSC) study protocol: background, methodology and mandatory items for the 2013/14 survey. https://www.hbsc.org/news/index.aspx?ni=2418. Accessed 3 Feb 2020

Dalmasso P, Borraccino A, Lazzeri G et al (2018) Being a young migrant in Italy: the effect of perceived social support in adolescence. J Immigr Minor Health. https://doi.org/10.1007/s10903-017-0671-8

du Plooy DR, Lyons A, Kashima ES (2019) The effect of social support on psychological flourishing and distress among migrants in Australia. J Immigr Minor Health 21:278–289. https://doi.org/10.1007/s10903-018-0745-2

Eurostat (2018) Eurostat: statistic explained, EU enlargements. https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:EU_enlargements. Accessed 3 Feb 2020

Fernandes-Alcantara AL (2018) Vulnerable youth: background and policies. Congressional Research Service, Washington, DC

Foster CE, Horwitz A, Thomas A et al (2017) Connectedness to family, school, peers, and community in socially vulnerable adolescents. Child Youth Serv Rev 81:321–331

Haugland S, Wold B (2001) Subjective health complaints in adolescence—reliability and validity of survey methods. J Adolesc 24:611–624

HBSC International Group (2018) Health Behaviour in School-aged Children (HBSC), HBSC-2013/14. https://www.uib.no/sites/w3.uib.no/files/attachments/hbsc-2013_14_ed.1.0.pdf. Accessed 3 Feb 2020

Hernandez-Plaza S, Alonso-Morillejo E, Pozo-Munoz C (2005) Social support interventions in migrant populations. Br J Soc Work 36:1151–1169. https://doi.org/10.1093/bjsw/bch396

Inchley J, Currie D, Young T et al (2016) Growing up unequal gender and socioeconomic differences in young people's health and well-being. https://www.euro.who.int/en/publications/abstracts/growing-up-unequal.-hbsc-2016-study-20132014-survey. Accessed 3 Feb 2020

Jensen FV (2001) Bayesian networks and decision graphs. Statistics for engineering and information science, vol 32. Springer, Berlin, p 34

Johnson T, Kulesa P, Cho YI, Shavitt S (2005) The relation between culture and response styles: evidence from 19 countries. J Cross Cult Psychol 36:264–277

Karvonen S, Vikat A, Rimpelä M (2005) The role of school context in the increase in young people's health complaints in Finland. J Adolesc 28:1–16

Koller D, Friedman N (2009) Probabilistic graphical models: principles and techniques. MIT Press, Cambridge, UK

Kouider EB, Koglin U, Petermann F (2014) Emotional and behavioral problems in migrant children and adolescents in Europe: a systematic review. Eur Child Adolesc Psychiatry 23:373–391

Lauritzen SL, Jensen F (2001) Stable local computation with conditional Gaussian distributions. Stat Comput 11:191–203

Lemma P, Borraccino A, Berchialla P et al (2015) Well-being in 15-year-old adolescents: a matter of relationship with school. J Public Health (Oxf) 37:573–580. https://doi.org/10.1093/pubmed/fdu095

Levin KA, Currie C (2014) Reliability and validity of an adapted version of the Cantril ladder for use with adolescent samples. Soc Indic Res 119:1047–1063

Mood C, Jonsson JO, Låftman SB (2016) Immigrant integration and youth mental health in four European countries. Eur Sociol Rev 32:716–729

Oppedal B, Røysamb E, Sam DL (2004) The effect of acculturation and social support on change in mental health among young immigrants. Int J Behav Dev 28:481–494

Paalman CH, Terwee CB, Jansma EP, Jansen LMC (2013) Instruments measuring externalizing mental health problems in immigrant ethnic minority youths: a systematic review of measurement properties. PLoS ONE 8:e63109

Pearl J (1988) Probabilistic reasoning in intelligent systems: networks of plausible inference. Morgan Kaufmann, San Francisco, CA

Phinney JS, Horenczyk G, Liebkind K, Vedder P (2001) Ethnic identity, immigration, and well-being: an interactional perspective. J Soc Issues 57:493–510

R Core Team (2016) R: a language and environment for statistical computing. R Foundation for Statistical Computing. Vienna, Austria

Ravens-Sieberer U, Kökönyei G, Thomas C (2004) School and health. In: Young people's health in context. Health policy for children and adolescents. WHO Regional Office for Europe, Copenhagen. https://www.euro.who.int/__data/assets/pdf_file/0008/110231/e82923.pdf. Accessed 3 Feb 2020

Resnick MD, Bearman PS, Blum RW et al (1997) Protecting adolescents from harm: findings from the national longitudinal study on adolescent health. JAMA 278:823–832

Rogers-Sirin L, Ryce P, Sirin SR (2014) Acculturation, acculturative stress, and cultural mismatch and their influences on immigrant children and adolescents' well-being. In: Dimitrova R, Bender M, van de Vijver F (eds) Global perspectives on well-being in immigrant families. Springer, Berlin, pp 11–30

Runarsdottir EM, Vilhjalmsson R (2015) Ethnic differences in youth well-being: the role of sociodemographic background and social support. Scand J Public Health 43:580–587

Scutari M (2017) Bayesian network constraint-based structure learning algorithms: parallel and optimized implementations in the bnlearn R Package. J Stat Softw 77:1–20. https://doi.org/10.18637/jss.v077.i02

Torsheim T, Cavallo F, Levin KA et al (2016) Psychometric validation of the revised family affluence scale: a latent variable approach. Child Indic Res 9:771–784

Torsheim T, Wold B (2001) School-related stress, support, and subjective health complaints among early adolescents: a multi-level approach. J Adolesc 24:701–713

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. Sch Psychol Int 21:195–212

UNICEF (2016) Fairness for children: a league table of inequality in child well-being in rich countries, Innocenti report card 13. UNICEF Off Res, Florence

Victorian Government, Department of Human Services D (2010) Positive pathways for Victoria's vulnerable young people: a policy framework to support vulnerable youth. Victorian Government Department of Human Services, Melbourne, Victoria

Vieno A, Santinello M, Pastore M, Perkins DD (2007) Social support, sense of community in school, and self-efficacy as resources during early adolescence: an integrative model. Am J Community Psychol 39:177–190

Vieno A, Santinello M, Lenzi M et al (2009) Health status in immigrants and native early adolescents in Italy. J Community Health 34:181–187

Walsh SD, Harel-Fisch Y, Fogel-Grinvald H (2010) Parents, teachers and peer relations as predictors of risk behaviors and mental well-being among immigrant and Israeli born adolescents. Soc Sci Med 70:976

Zimet GD, Dahlem NW, Zimet SG, Farley GK (1988) The multidimensional scale of perceived social support. J Pers Assess 52:30–41

Zimet GD, Powell SS, Farley GK et al (1990) Psychometric characteristics of the multidimensional scale of perceived social support. J Pers Assess 55:610–617