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ORIGINAL ARTICLE

Spirituality as a protective health asset for young people: an international comparative analysis from three countries

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Abstract

Objectives Spirituality has been proposed as a potential health asset a 'developmental engine' that works by fostering the search for connectedness, meaning and purpose. The aim is to examine to what extent spiritual health might be protective of young people's overall health and well-being.

Methods In 2014, young people aged 11, 13, and 15 years in England, Scotland and Canada were surveyed as part of the HBSC study ($n = 26{,}701$). The perceived importance of spiritual health and domains (connections with self, others, nature, and the transcendent) was measured in these countries. Multi-level log-binomial models were used to explore relationships between spiritual health and three self-reported positive health outcomes: general health status, subjective life satisfaction and health complaints.

Results Higher levels of perceptions of the importance of spiritual health, both overall and within the four domains, were associated with higher likelihoods of reporting each of the positive health outcomes.

Conclusions Spiritual health appears to operate as a protective health asset during adolescence and is significantly shaped by external relationships and connections.

Keywords Adolescent · Young people · Gender · Nature · Spiritual health · Spirituality

Introduction

Health and well-being during the second decade of life are predictors of positive social and emotional development and achievement of academic potential during adolescence, as well as future life chances and higher well-being in adulthood (Chanfreau et al. 2013). Identification of factors that enable young people to thrive during adolescence is an important objective for effective health promotion.

Adolescent well-being across most OECD countries especially in relation to mental health has declined over the past decade, despite large reductions in young people's participation in traditional health risk behaviours (Inchley et al. 2016). Improvements in health and well-being outcomes may emerge when young people have been equipped to deal with general life stressors and maintain high levels of well-being. Evidence from a longitudinal birth cohort study (Richards and Huppert 2011) demonstrated that those achieving positive subjective well-being in childhood and adolescence are also more likely to have positive well-being in later life.

In order to increase well-being within populations of young people, practitioners and policy makers are required to reach consensus on outcomes and indicators for its assessment, and lessen their focus on reductions in health risk behaviours. This will need to include a reorientation towards addressing emotional health, which can be defined

For the HBSC Child Spiritual Health Writing Group which consists of investigators from the HBSC study in the following countries, Canada, Czech Republic, England, Israel, Poland, Lativa and Scotland.

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broadly as a positive state of well-being that encompasses effective functioning to meet the demands of every day stressors, as well as consideration of protective factors (Coleman 2009). Paradigms such as positive youth development (Lerner et al. 2009) and the health assets model (Morgan and Haglund 2009) seek to understand salient factors that contribute to young people's overall well-being and enable successful navigation of challenges and life stressors (Brooks and Kendall 2013). According to the health assets model, factors that are protective of health and overall well-being can be amassed during childhood and adolescence and are pivotal for the development of resilience in these age groups (Rutter 1990).

Protective health assets have been categorized according to whether they are external or internal to the individual (Morgan and Haglund 2009). Significant external protective health assets to young people include supportive adult relationships (Fenton et al. 2010) school belonging (Kia-Keating et al. 2011) teacher connectedness (Garcia-Moya et al. 2014) and neighbourhood safety and social capital (Brooks et al. 2012). Assets internal to the adolescent include positive attributes or a positive sense of self, and encompass concepts related to individual resilience or social competency such as self-esteem and self-efficacy as well as problem-solving approaches to managing difficulties and challenges (Kia-Keating et al. 2011). Models of health assets consider interactions between broader determinants such as social, economic, environmental factors and internal positive attributes that interact to produce overall health (Morgan and Ziglio 2007).

Specific assets can be especially protective for young people in different contexts. 'Connectedness' is a consistent theme that pervades much of this literature base, and appears within the field of health assets for populations of young people (Garcia-Moya et al. 2014). For example, those who report feeling a high degree of belonging to their communities, families and schools also report higher subjective life satisfaction and better emotional health and well-being (Brooks et al. 2012). This idea of connectedness too is inherently part of what constitutes a healthy sense of spirituality (Hay and Nye 1998).

An increasing body of work has proposed that spirituality has the potential capacity to work as a 'developmental engine' by generating the search for connectedness, meaning and purpose (Benson et al. 2003). Spirituality has been seen as having particular significance as a key dimension of child and youth health and the right to spiritual development is enshrined in the United Nations' Convention on the Rights of the Child (General Assembly UN 1989). Alongside social, emotional and physical domains, spirituality has been considered to constitute a fourth dimension of health. It has been consistently recognized as a multidimensional construct consisting of multiple domains that dynamically interacts with other dimensions of health and overall well-being (including physical, social and mental well-being) (Hay and Nye 1998; Miller and Thoresen 2003).

However, there is little consensus as to a concise operational definition of youth spiritual health, and as this field is in its early stages, a proposal of a single unifying definition is premature given the current developing evidence base (Michaelson et al. 2016; Vader 2006). However, in order to facilitate discussion the analysis presented here is grounded in the following working definition: spiritual health is a dimension of health that entails a condition of spiritual well-being. This is a "way of being" that involves some capacity for awareness of the sacred qualities of life experiences and is characterized by connections in four domains: (1) connections to self, (2) others, (3) nature (Louv 2005), and (4) with a sense of mystery or larger meaning to life, or whatever one considers to be ultimate (Fisher 2010; Hay and Nye 1998).

In terms of adolescent health and well-being, spirituality has been explored in relation to associations between health risk behaviours (Cotton et al. 2005), physical and emotional health outcomes (Cotton et al. 2005; Larson and Larson 2003). The potential for spirituality as a domain of health (as spiritual health) that operates as a protective health asset and resources for health and well-being has been given relatively less attention to date, particularly in relation to positive outcomes in terms of enhanced subjective life satisfaction, and health status.

Spiritual health has been seen to contribute to thriving during the first two decades of life, as it represents a way of being that is both learned and can be a determinant of how individuals respond to life experiences. Speculatively, we hypothesize that spiritual health may represent an important asset for young people and especially one that creates a sense of connectedness and thereby enhances agency. The four domains of external and internal relational connectedness, can be considered to form the core components of spiritual health and may offer the possibility to generate a capacity for individuals to both thrive and sustain and develop a sense of agency (Lerner et al. 2009; Hay and Nye 1998).

In terms of furthering the understanding of spiritual health as a protective health asset, it is important to consider its potential significance as a universal factor including how spiritual health might be a protective health asset for diverse groups of young people. Within the scope of the HBSC data we can consider two contextual aspects, gender and cross-country comparison. Gender differences become especially pronounced for mental health outcomes during adolescence and are most often deleterious to girls. If boys and girls report different experiences related to spiritual health, this will further advance our understanding of protective health assets and as well offer a gender-sensitive approach for the development

of health promotion initiatives. Thus, gender is an important variable in this study.

In relation to international comparisons our analyses were performed in three countries, which reflect different cultural contexts and population bases. Spirituality and religious involvement are related, though discrete, constructs. Examining spiritual health in these three different cultural contexts offers a means to demonstrate the potential relevance of spiritual health across a variety of cultural contexts, particularly in relation to religious involvement.

The primary research question was to examine, if perceived importance of spiritual health could be firstly, protective of young people's overall health and well-being and secondly and to determine if there was variation by gender across different country contexts? In addition, we set out to examine if the specific four domains of spirituality contributed to the development of a positive sense of subjective well-being, life satisfaction and positive physical health status.

Methods

Study populations, sampling and procedures

Countries involved in this analysis included Canada, England and Scotland. General health surveys were conducted in each country during the academic year 2013–2014. We followed the common research protocol of the Health Behaviour in School-aged Children Study, or HBSC (www.hbsc.org) that involved surveying 26,701 students aged 11–15 years in classroom settings from random samples of schools, stratified by type of school and regions on a replacement basis. Samples of school-aged adolescents obtained in England and Scotland were drawn to be self-weighting, while the Canadian sample involved oversampling in some provinces and territories. Hence, standardized weights were derived in Canada in order that its sample was representative nationally. At the student-participant level, response rates were 77% in Canada, 92% in England, and 88% in Scotland.

Measures

Adolescent spiritual health

The HBSC adaptation of a multidimensional spiritual health scale is described in a companion manuscript (Michaelson et al. 2016). In brief, the scale consists of eight questions adapted (for pre-adolescent levels of literacy) from Fisher's Spiritual Well-being scale [further description of the psychometric properties, merits and limitations of these measures are provided in a companion article and associated commentary (Michaelson et al. 2016)]. Two questions were used for each of the four standard spiritual health domains (connections to: self, others, nature and the land, and the transcendent). Students responded to these questions rating their importance using one of five response categories (1-"not at all important" to 5-"very important."). Confirmatory factor analysis conducted in Canada suggests that these items are best examined by domain (Michaelson et al. 2016), although principal components analysis suggested that it is possible to combine the 8 items into a composite, multidimensional scale (Cronbach's alpha 0.86 in Canada, 0.84 in England, and 0.83 in Scotland).

General health status

Each respondent rated their self-perceived personal health status using the following item: "Would you say your health is?": 1-"Excellent"; 2-"Good"; 3-"Fair"; 4-"Poor". This self-rated health measure represents a relatively stable construct over repeated observations made with adolescents, and ratings used with this measure deteriorate consistently with a lack of general well-being, disability, healthcare attendance and health-compromising behaviour, attesting to item validity. The outcome used in subsequent analyses was excellent reported health status versus all other responses.

Life satisfaction

An adaptation of the Cantril ladder a standard visual analogue scale was used to assess emotional health status and that is depicted in the form of a ladder where 10 indicates "the best possible life" and 1 indicates "the worst possible life". This scale has very good test–retest reliability when used with adolescents, and correlates strongly with other more extensive measures of life satisfaction (Levin and Currie 2013). The outcome used in subsequent analyses was high life satisfaction (a rating of 9 or more on the ladder) versus all other responses.

Health complaints

The eight-item HBSC symptoms checklist was used to assess the frequency (5 categories—"rarely or never" to "about every day") of health complaints (headache; stomach ache; backache; feeling low; irritability or bad temper; feeling nervous; difficulties in getting to sleep; and feeling dizzy) (Haugland and Wold 2001). These health complaints are an important indicator of an individual's psychosocial health and well-being (SAS Institute 2013). Responses are summed up to produce a composite scale ranging from 0 to 32, again with excellent psychometric properties as indicated by confirmatory factor analysis (Haugland and Wold 2001), and test–retest reliability (Ravens-Sieberer et al. 2012). The outcome used in subsequent analyses was low multiple health complaints as indicated by being in the bottom quartile of the response distribution.

Demographic covariates

Based upon reported birth month and year and the date of questionnaire administration, the age of each respondent was estimated. Students also reported their gender (boy or girl). Schools in each country were also numbered in sequence so that possible effects of the clustered nature of data collection (students nested within schools then countries) could be taken into account analytically.

Statistical analysis

Data analyses were conducted with SAS 9.3 (SAS Institute 2013) Descriptive analyses were used to characterize the samples in each country by age and gender. Composite spiritual health scores were estimated for each participant, and placed into five groups based upon the distribution of scores in England, and anchored on the response totals (5 categories—"8 to 24" (lowest) to "36 to 40" (highest)).

We then explored relationships between these spiritual health scores and the three outcome measures (excellent health status, high life satisfaction, low levels of health complaints) using a series of multivariable log binominal models, stratified by country and gender (boys vs. girls) and adjusted for age as a covariate. Schools were included in these models as random effects. Estimates of effect are presented as adjusted relative risks and associated 95% confidence limits. Models were then repeated, as above, but considering scores for each of the four individual domains of spiritual health (connections to self, others, nature, and the transcendent) as the predictor variable. This modelling was meant to be descriptive as opposed to etiological, and we focused primarily on the consistency of patterns in the health outcomes by aspects of spiritual health, as opposed to explaining the deep mechanisms that might underlie these patterns. Hence, we did not adjust for multiple confounders, effect modifiers, or potential mediation effects in these analyses.

Results

Samples of young people available for study in each country are described demographically in Table 1. The Canadian HBSC samples targeted adolescents in each of the five age levels described. The English sample mainly targeted young people aged 11, 13, and 15 years; consistent with the international HBSC protocol (Inchley et al. 2016). The Scottish sample, however, only studied grades serving young people the two older age groups. Figure 1 summarizes the associations between the composite spiritual health score and the outcome of "excellent health status", stratified by country and gender and adjusted for differences in age. Findings from these descriptive models suggested an almost universal pattern where higher levels of the importance of spiritual health were associated with higher likelihoods of reporting excellent health status. This pattern too was evident for the other two outcomes of "high life satisfaction" and "low psychosomatic symptoms" (data not shown; full results available at our website: http://www.childhealth2.com). Each of these trends reached statistical significance, almost all were suggestive of a dose-dependent pattern, and the findings were very consistent across the health outcomes. In addition, the strength of these patterns was higher in girls vs. boys in almost all of the models, with 2- to 3-fold risks of the excellent health status outcome reported for the highest relative to lowest categories of spiritual health among girls.

Table 1 Demographics (age and gender): 2013/2014 Health Behaviour in School-aged Children Study, 3-country analysis

	England		Scotland		Canada		Total	
	n	(%)	*n*	(%)	*n*	(%)	*n*	(%)
Boys								
Total	2109		2085		8891		13,085	
≤ 11	577	(27)	–	–	828	(9)	1405	(11)
12	234	(11)	–	–	1655	(19)	1889	(14)
13	469	(22)	1064	(51)	1829	(21)	3362	(26)
14	165	(8)	–	–	1868	(21)	2033	(16)
≥ 15	664	(31)	1021	(49)	2711	(30)	4396	(34)
Girls								
Total	2100		2034		9484		13,618	
≤ 11	508	(24)	–	–	943	(10)	1451	(11)
12	205	(10)	–	–	1699	(18)	1904	(14)
13	542	(26)	1073	(53)	1914	(20)	3529	(26)
14	186	(9)	–	–	2164	(23)	2350	(17)
≥ 15	659	(31)	961	(47)	2764	(29)	4384	(32)

The models described in Fig. 1 were repeated in for the three outcomes, but this time considering each of the four spiritual health domains as independent variables. All analyses were performed separately for boys and girls. Table 2 presents the results for "excellent health status" as an illustration; findings for the other two outcomes were consistent with the observed patterns (again, available at: http://www.childhealth2.com). These findings reinforced the strength and consistency of the observed relationships within each of the three countries, especially among girls, with higher reported domain scores being associated with higher relative positive health outcomes. This was especially true for the specific domains of "connections to self" and "connections to others". Relationships with the domains of "connections to nature and the land" and

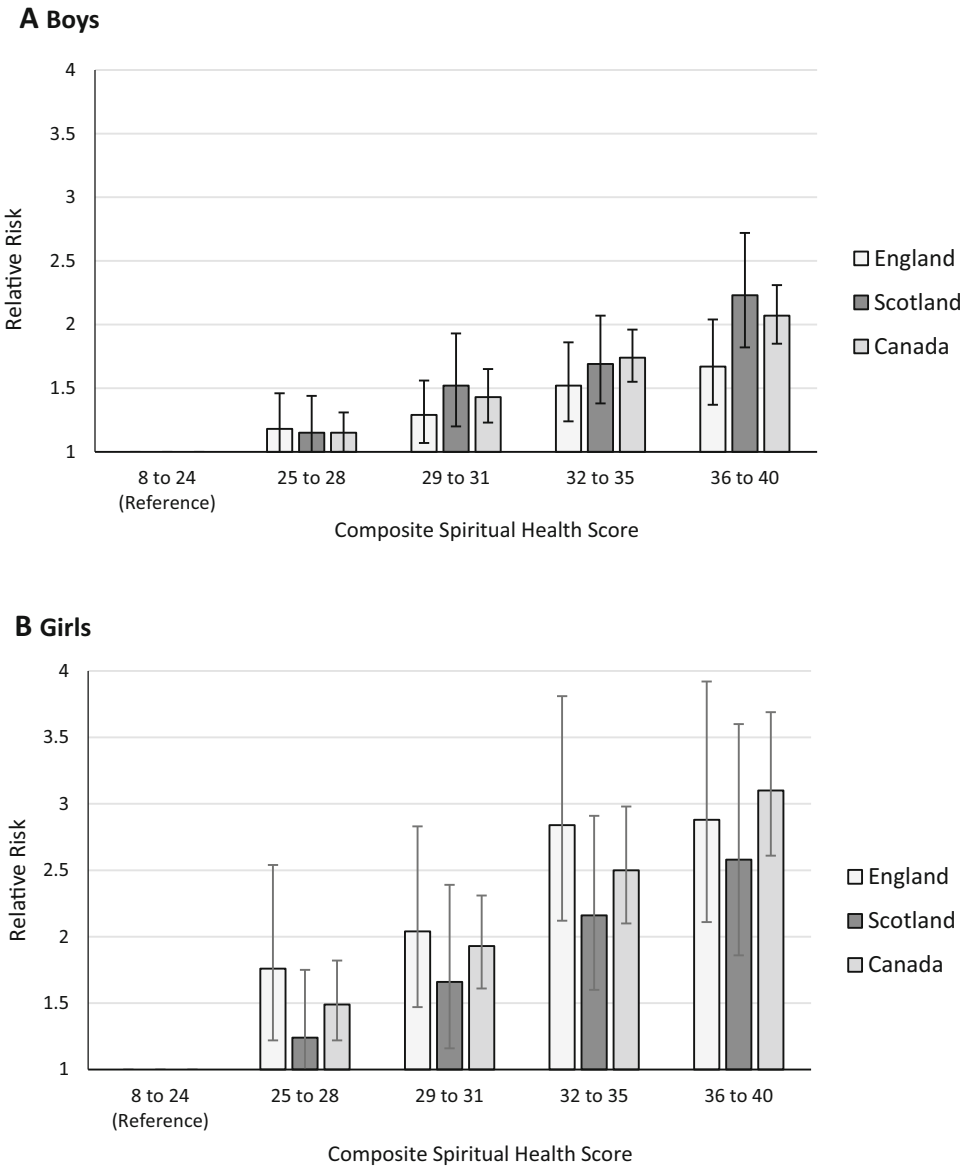

Fig. 1 Relative risk of reporting "Excellent" health status by composite spiritual health score in boys (**a**) and girls (**b**), for England, Scotland, and Canada; 2013/2014 Health Behaviour in School-aged Children Study. Relative risk and associated 95% confidence intervals are adjusted for age and clustering within school. Error bars represent the 95% confidence interval. Tests for trend by composite spiritual health score were significant at $p < 0.001$

"connections to the transcendent" were also evident, although their strength and statistical significance were, on average, weaker than the first two domains.

Discussion

In this original cross-national analysis, we set out to describe relationships between spiritual health, its four domains, and various indicators of health status among English, Scottish and Canadian adolescents. We grounded this analysis within the broader theory that spiritual health may represent a positive health asset supporting the development of young people (Morgan and Ziglio 2007). Study findings affirm that young people in each of the three countries attached high levels of importance to each of the four domains of spiritual health. In addition, strong and consistent relationships were found between the overall and domain-specific measures of spiritual health and three different health outcomes. This may relate to what Schnell (2011) has described as sources of meaning in that having "numerous, diverse, and, especially, self-transcendent sources of meaning" contribute to the likelihood of living a meaningful life. It is possible that connections in several or even for some young people all of the four domains of spiritual health provide a healthy diversity of connections or experiences that provide meaning in an adolescents' life."

The study findings, while exploratory, do indeed suggest that positive spiritual health has the potential to be a significant health asset among adolescents. Moreover, the consistent nature of the positive relationships across

Table 2 Associations between four spirituality domains and excellent health status: 2013/2014 Health Behaviour in School-aged Children Study, 3-country analysis

	England			Scotland			Canada		
	%	RR	(95% CI)	%	RR	(95% CI)	%	RR	(95% CI)
Connection to others									
Boys									
2–6 (lowest)	28	1.00	Ref.	22	1.00	Ref.	24	1.00	Ref.
7	30	1.07	(0.83–1.38)	20	0.89	(0.66–1.20)	23	0.96	(0.82–1.12)
8	29	1.04	(0.83–1.29)	21	0.97	(0.78–1.19)	28	1.19	(1.07–1.33)
9	35	1.23	(1.04–1.45)	34	1.54	(1.25–1.88)	30	1.28	(1.12–1.45)
10 (highest)	47	1.61	(1.33–1.95)	37	1.65	(1.37–1.98)	42	1.77	(1.60–1.96)
Girls									
2–6 (lowest)	14	1.00	Ref.	11	1.00	Ref.	13	1.00	Ref.
7	13	0.95	(0.63–1.44)	7	0.66	(0.38–1.16)	13	0.97	(0.77–1.23)
8	14	0.94	(0.66–1.34)	15	1.39	(0.87–2.22)	18	1.36	(1.11–1.67)
9	23	1.52	(1.13–2.05)	18	1.67	(1.10–2.52)	23	1.72	(1.43–2.06)
10 (highest)	34	2.06	(1.57–2.69)	21	1.96	(1.34–2.87)	34	2.46	(2.07–2.92)
Connection to self									
Boys									
2–5 (lowest)	26	1.00	Ref.	18	1.00	Ref.	19	1.00	Ref.
6–7	21	0.83	(0.58–1.17)	16	0.90	(0.58–1.40)	18	0.96	(0.78–1.19)
8	29	1.13	(0.81–1.56)	20	1.12	(0.74–1.70)	24	1.28	(1.07–1.53)
9	36	1.40	(1.04–1.88)	25	1.34	(0.90–2.02)	32	1.67	(1.38–2.01)
10 (highest)	45	1.70	(1.29–2.25)	37	2.03	(1.40–2.96)	42	2.17	(1.84–2.57)
Girls									
2–5 (lowest)	14	1.00	Ref.	5	1.00	Ref.	10	1.00	Ref.
6–7	11	0.75	(0.47–1.21)	10	2.12	(1.00–4.48)	11	1.18	(0.90–1.56)
8	12	0.81	(0.51–1.28)	12	2.36	(1.17–4.76)	17	1.79	(1.43–2.25)
9	23	1.54	(1.10–2.15)	18	3.64	(1.82–7.30)	22	2.26	(1.78–2.87)
10 (highest)	33	2.01	(1.46–2.77)	22	4.41	(2.32–8.39)	34	3.35	(2.69–4.16)
Connection to nature									
Boys									
2–5 (lowest)	33	1.00	Ref.	21	1.00	Ref.	23	1.00	Ref.
6–7	28	0.84	(0.69–1.01)	23	1.08	(0.85–1.37)	26	1.13	(1.02–1.26)
8	39	1.13	(0.93–1.38)	28	1.33	(1.04–1.70)	31	1.35	(1.21–1.51)
9	38	1.08	(0.84–1.37)	35	1.63	(1.26–2.11)	35	1.47	(1.30–1.67)
10 (highest)	49	1.40	(1.17–1.68)	40	1.88	(1.55–2.27)	43	1.85	(1.68–2.05)
Girls									
2–5 (lowest)	15	1.00	Ref.	13	1.00	Ref.	13	1.00	Ref.
6–7	18	1.17	(0.94–1.47)	12	0.91	(0.67–1.24)	18	1.44	(1.22–1.71)
8	23	1.40	(1.07–1.82)	20	1.51	(1.10–2.07)	25	1.87	(1.60–2.20)
9	34	1.98	(1.54–2.54)	23	1.76	(1.24–2.49)	29	2.10	(1.78–2.47)
10 (highest)	37	2.04	(1.66–2.52)	23	1.80	(1.32–2.46)	34	2.46	(2.11–2.87)
Connection to transcendence									
Boys									
2 (lowest)	35	1.00	Ref.	24	1.00	Ref.	27	1.00	Ref.
3–4	32	0.89	(0.76–1.04)	24	0.97	(0.78–1.21)	26	0.94	(0.85–1.05)
5–6	36	0.98	(0.83–1.14)	27	1.08	(0.87–1.33)	32	1.19	(1.07–1.33)
7–8	39	1.02	(0.88–1.17)	27	1.11	(0.86–1.44)	34	1.23	(1.10–1.38)
9–10 (highest)	43	1.13	(0.94–1.35)	40	1.63	(1.34–1.98)	40	1.45	(1.31–1.61)

Table 2 (continued)

	England			Scotland			Canada		
	%	RR	(95% CI)	%	RR	(95% CI)	%	RR	(95% CI)
Girls									
2 (lowest)	20	1.00	Ref.	13	1.00	Ref.	20	1.00	Ref.
3–4	22	1.05	(0.82–1.35)	14	0.99	(0.72–1.37)	18	0.87	(0.76–1.01)
5–6	24	1.07	(0.83–1.38)	15	1.08	(0.77–1.50)	23	1.09	(0.94–1.25)
7–8	27	1.11	(0.80–1.54)	19	1.40	(0.98–1.99)	26	1.17	(1.00–1.36)
9–10 (highest)	33	1.34	(1.05–1.69)	27	2.03	(1.44–2.94)	34	1.46	(1.27–1.67)

(1) All models are adjusted for age, and clustering within schools. Values represent the relative risk (RR) and 95% confidence interval (CI)

Ref reference category

various standard indicators of health status are suggestive of a more universal effect, at least in countries with cultural contexts that are similar to the three countries involved here.

One of the central concerns within an assets-based analysis is the need to recognize the specific contexts and sub-populations for whom assets exert their positive effects. Findings presented here are suggestive of a substantial gendered effect, with girls benefiting more than boys with respect to the possible influence of spiritual health on positive health outcomes across the various domains of spiritual health. This finding is consistent with analogous international studies conducted in the same countries that have identified a consistent gender difference in the related constructs of subjective well-being and emotional well-being (Fenton et al. 2010; Brooks et al. 2009). These past studies have also observed declines in subjective well-being of girls from across Europe and North America over the last decade, a pattern not observed to the same extent among their male peers (Inchley et al. 2016). Girls are more also likely to report experiencing school pressure negatively, regularly feeling low or anxious, and engaging in self-harm (Klemera et al. 2016). Our findings indicate that by placing a value on social domains such as, connections to others and empathetic feelings, along with experiencing meaning and purpose in life, there is the potential to optimize the health and well-being of girls via spiritual health and its associated connections. While also important for boys, these external and internal connections may be a protective health asset associated with higher levels of emotional and physical health that is particularly salient for the experiences of girls and young women.

It is worth noting, however, that an alternative explanation for the gender-based findings is that the questionnaire items may also be simply measuring girls' spiritual health and their conceptualization of spirituality more readily than their male counterparts. Potentially holistic spiritualties could be aligning with traditional representations of femininity (self-sacrifice), while also simultaneously and positively sanctioning expressive selfhood (living for oneself) (Sointu and Woodhead 2008). An overt commitment to spirituality thereby may allow women and girls to negotiate a socially acceptable version of self, in which they are both living for others and oneself (Sointu and Woodhead 2008). Hence, it is possible that the items employed for this study are tapping into this gendered duality and this is reflected in the responses obtained from young women. Exploration of gender in relation to measures of spirituality represent an important next step for the development of measurement tools in this field.

The development of empathy and a positive sense of self have been linked to the developmental growth of prosocial behaviours (Wölfer et al. 2012). The findings presented here suggest that commitment to emphatic responses to others and having a coherent sense of individual purpose and meaning is not only related to social development, but also the possession of positive health and well-being. Altruistic and empathetic responses may therefore be highly connected to positive health and well-being during adolescence.

A statistically significant relationship between connection to nature and positive emotional health was anticipated, as such relationships have been demonstrated previously, particularly among females (Barton et al. 2016). However, this relationship did not emerge as being particularly strong. Speculatively, this may have practical explanations surrounding both connection and access with nature. This has been termed "the extinction of experience" (Pyle 2003) and may also reflect social change as the current generation is restricted from accessing nature independently due to increased adult surveillance (Ward Thompson et al. 2008).

The relatively weaker associations found in relation to the fourth and final domain of transcendence or specific connections with a higher power suggests that research into

spiritual health needs to be undertaken in a way that teases apart adolescents' perspectives and experiences concerning religiosity from the more secular aspects of spiritual health. The observed associations may also relate to the questions asked in this domain, which may be perceived as asking about a connection to religious constructs rather than the broader experience of connection to the transcendent that is described in the literature base.

In a previous study (Michaelson et al. 2016), developmental patterns in spiritual health were profiled in six countries. The self-rated importance of spiritual health, both overall and within most questions and domains, declined by age, this persisted for both genders and in all countries, and was most notable for the domains of "connections with nature" and "connections with the transcendent". In this current analysis, neither the domain "connection to nature" or "connection with the transcendent" appeared to be driving the strong positive relationship that we observed in relation to emotional health. However, the domains "connection with nature" or "connection with the transcendent" may potentially still operate as protective health assets. Indeed, in Table 2 we noted that girls in Scotland who report that a connection to nature is important are also nearly three times more likely to report low psychosomatic symptoms than their peers who did not report a connection to nature as being important. Also in Scotland, girls who reported the importance of a strong connection to the transcendent domain also reported excellent health status two times more often than others who did not. Clearly, all four domains had a protective relationship with emotional health, and could be considered as potential health assets. The question is not "Why do two domains protect while two do not?" but instead "Why do the first two domains (connections to self and connections to others) protect so much more than the second two (connections to nature and connections to the transcendent)?"

Three important methodological limitations should be taken into account when interpreting the findings. First, the cross-sectional design of the study limits our ability to make definite claims about the causal direction of the reported associations. Second, this is an initial descriptive study that was meant to explore relationships between spiritual health and several other health outcomes, rather than to definitely test hypotheses about the mechanisms underlying such relationships. Finally, as discussed in a companion article (Michaelson et al. 2016), the measure of spiritual health used in this study describes the importance attributed to spirituality, rather than the direct reported experiences of young people.

Our study findings suggest that the concept of spirituality as a positive health asset warrants attention from health promotion specialists, and others who are stakeholders in the health of adolescents. The findings add weight to the notion that benefits for adolescent health and well-being are likely to be leveraged by addressing a broader range of outcomes than is encompassed by a deficit approach. In terms of interventions to develop resilience and promote well-being, focusing on exposure to nature and life mysteries or religiosity may be less impactful for improving young people's health and well-being than enabling adolescents to develop prosocial, constructive supportive relationships. The findings also provide support for the development of health promotion interventions that promote personal meaning and encourage looking externally at the relationships that surround the adolescent. Moreover, the strong associations identified in this paper between spiritual health and many positive health outcomes are not yet fully understood and warrant being further held to light via modern sociological theory and empirical investigation.

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Compliance with ethical standards

Ethics approval All procedures were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments. All questionnaires were anonymous. Approval was gained from the following ethics review boards: Queen's University (Canada), the University of Hertfordshire (England), and St Andrews University (Scotland). Student participation was voluntary, and consent (explicit or implicit) was sought from school administrators, parents, and participating students as per national human subject requirements.

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