



Establishing spirituality as an intermediary determinant of health among 42,843 children from eight countries

Valerie Michaelson^{a,*}, Nathan King^b, Kastytis Šmigelskas^c, Agnė Slapšinskaitė Dackevičienė^c, Marta Malinowska-Cieślak^d, Karen Patte^a, Pauli Gardner^a, Jo Inchley^e, William Pickett^{a,b}, for the HBSC Spiritual Health Writing Group¹

^a Department of Health Sciences, Brock University, 1812 Sir Isaac Brock Way, St. Catharines, Ontario, Canada

^b Department of Public Health Sciences, Queen's University, Carruthers Hall, 62 Fifth Field Company Lane, Kingston, Ontario, Canada

^c Health Research Institute, Faculty of Public Health, Medical Academy, Lithuanian University of Health Sciences, Tilžės g. 18, Kaunas LT-47181, Lithuania

^d Department of Environmental Health, Faculty of Health Sciences, Jagiellonian University, Medical College, Skawińska Street 8, 31-066 Kraków, Poland

^e MRC/CSO Social and Public Health Sciences Unit, University of Glasgow, Glasgow, UK

ARTICLE INFO

Keywords:

Determinants of health
Child and adolescent health
Global health
Spiritual health
Health equity

ABSTRACT

The World Health Organization (WHO) Commission on the Social Determinants of Health (CSDH) conceptual framework identifies socio-economic position as a structural determinant of health. Recognized intermediary determinants include biological, behavioural, and psychosocial factors. We examined whether connections afforded by a healthy spirituality potentially act as unrecognized intermediary determinants in adolescent populations, contributing to inequities in mental health. Reports from 42,843 children (21,007 boys, 21,836 girls) from eight countries who participated in the 2017–2018 *Health Behaviour in School-aged Children (HBSC)* study were used to describe correlations between family affluence and positive levels of mental health, using a cross-sectional design. Based on the CSDH conceptual framework and multivariable regression analyses, we then examined whether these associations were mediated by spiritual health. Connections afforded by a high level of spiritual health were universally correlated with positive mental health status. In three Western European nations (England, Scotland, and Wales) and Canada affluence was correlated with better mental health and this was partially mediated by spiritual health. Among the four Eastern European countries (Latvia, Lithuania, Moldova, Poland), our findings did not support aspects of the CSDH framework that focus on affluence as a direct determinant of health. Spiritual health potentially is an intermediary determinant of children's health in some Western countries, but not in Eastern countries. The universality of social determinants of health models and the measures used in their evaluation require careful assessment across cultures, political contexts, and health outcomes.

1. Introduction

Understanding why some children thrive while others do not requires focus on the social determinants of health: “the conditions in which [children] are born, grow, live, work, and age” (Marmot, 2015). Shaped by social contexts and policies, such determinants include the socioeconomic and structural resources required for children to have their basic needs met (Marmot, 2015; Solar and Irwin, 2010; WHO

Commission on Social Determinants of Health, 2008; Viner et al., 2012). Inequalities in access to these resources dictate whether or not children reach their full potential.

The World Health Organization (WHO) Commission on the Social Determinants of Health (CSDH) (Solar and Irwin, 2010) developed a conceptual framework for action on the social determinants of health that linked health and illness to structural determinants through mediated pathways (Fig. 1). Such pathways begin with varying levels of

* Corresponding author at: Department of Health Sciences, Brock University, 1812 Sir Isaac Brock Way, St. Catharines, ON L2S 3A1, Canada.

E-mail address: vmichaelson@brocku.ca (V. Michaelson).

¹ The HBSC Spiritual Health Writing Group includes the following investigators: Canada: V Michaelson, W Pickett, C Davison; Czech Republic: M Kalman, I Jirásek; Israel: S Walsh; Lithuania: K Šmigelskas; Agnė Slapšinskaitė-Dackevičienė; Latvia: I Pudule, I Gobina; Poland: J Mazur, M Malinowska-Cieslak; Republic of Moldova: G Lesco; Scotland: J Inchley; Wales: C Roberts.

<https://doi.org/10.1016/j.ypmed.2024.107846>

Received 27 May 2023; Received in revised form 19 December 2023; Accepted 2 January 2024

Available online 4 January 2024

0091-7435/Crown Copyright © 2024 Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

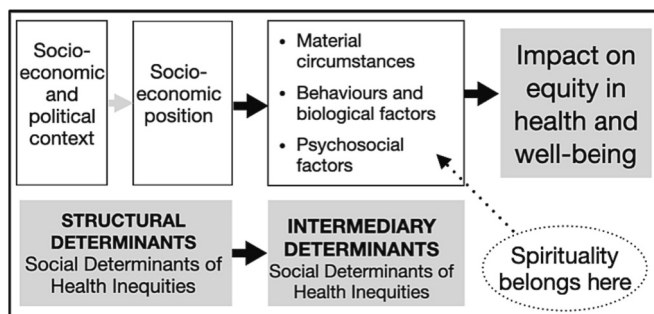


Fig. 1. Proposed conceptual framework adapted to include spirituality as an unrecognized intermediary determinant of health, based upon the WHO-CSDH Social Determinants of Health Model (Solar and Irwin, 2010).

socio-economic position but are also associated with specific “intermediary determinants of health” (Solar and Irwin, 2010). These include material circumstances and also behavioural, biological, and psychosocial factors. For children, these intermediary determinants act as mediators of health and disease processes that can lead to inequities in health and well-being (Solar and Irwin, 2010; Goldfeld et al., 2018; Thornton and Yang, 2022). Etiological research on the social determinants of health in children typically focuses on deficits and barriers to thriving, such as the profound impacts of inadequate income and housing (Krieger and Higgins, 2002; Currie et al., 2009/2010). Yet, such models also require focus on factors that promote human flourishing (Marmot et al., 2010; Marmot, 2015), and the conditions through which children are supported to use sociocultural resources to support their own health (Frank et al., 2020). In keeping with this thinking, fostering conditions for a healthy spirituality may be an important yet overlooked determinant of health. Beyond work with Indigenous populations (e.g. Castellano, 2015), this topic has been largely ignored in mainstream health agendas. Yet, attention to non-material determinants of health—such as spirituality—provides important insight into health deficits that are caused by socio-economic disadvantage.

Many conceptualizations of spirituality exist. Our research is grounded in a “living definition” of spiritual health that was developed in Canada and that emerged from the experiences and everyday usage of the word by children (Michaelson, 2021). Though “different for everyone”, spiritual health involves “connections that make us human.” (Michaelson et al., 2016a) This corresponds with a conceptual model in which spirituality is understood as the strength of connections within four relational domains—to oneself (through a sense of meaning and purpose), to others via social relationships, to nature, and to the transcendent (Michaelson et al., 2016a; Fisher, 2011). This framework departs from (often US) frameworks that conflate spirituality with religion (Cotton et al., 2006). The four domains of spirituality can be measured validly and reliably in child populations (Shaver et al., 2020). The perceived importance of spirituality and its domains varies by country and within socio-demographic strata (Michaelson et al., 2016a; Michaelson et al., 2016b), yet strong connections in these domains are consistently protective to the health of children (Michaelson et al., 2021). The domains “connections to self” and “connections to others” appear to be stronger and more universal protective health assets than more formal experiences of religion (i.e., “connections to the transcendent”) (Michaelson et al., 2021).

Based on a growing body of evidence (Shaver et al., 2020; Michaelson et al., 2016b; Michaelson et al., 2021), we have established that spiritual health relates strongly to conventional health outcomes including positive mental health (Michaelson et al., 2016a; Michaelson et al., 2023). Moving forward, we hypothesize that it represents a potential intermediary determinant with unrecognized importance to the health of children. Such innovative thinking may invigorate new health knowledge that was previously seen as irrelevant (Dyar et al., 2022) and

augment current understandings of the social determinants of the health. To test these ideas, we used available population health data collected from large contemporary samples of young people in eight countries; four of these are Western (Canada, England, Scotland, and Wales) and four are Eastern European (Latvia, Lithuania, Moldova, Poland). We focused our analysis on an established outcome measure describing positive mental health and well-being during adolescence due to its importance to child populations globally (Heinz et al., 2022). Using the Commission on Social Determinants of Health (CSDH) conceptual framework (Solar and Irwin, 2010) as a foundation, we explored whether spiritual health in children mediated relationships between economic positions and mental health across eight diverse countries and cultures. Our hope was to establish whether connections afforded by a healthy spirituality act as intermediary determinants in child populations.

2. Methods

2.1. Data source

The WHO-affiliated Health Behaviour in School-aged Children (HBSC) study is a cross-national general health survey involving children aged 11–15 years (Inchley and Currie, 2016). Established in 1983, HBSC involves school surveys administered according to an international protocol in four-year cycles. In 2018 (01 October 2017–30 Sept 2018), nine participating countries administered an optional module on child spiritual health (N.B.; Russian data were purposefully excluded from this analysis).

Recruitment to the 2018 HBSC study followed a multi-stage sampling design, with participants nested within schools, geographic regions, then countries. Sampling was stratified by type of school and geographic regions on a replacement basis. Participating students completed an anonymous questionnaire during a 40–60 min in-classroom session, typically overseen by teachers and school staff, but sometimes overseen by trained researchers. Questionnaires were returned centrally for data entry and cleaning.

2.2. Ethical considerations

National teams obtained approval to conduct the survey from the ethics review board associated with each of their respective institutions. Parental consent was active or passive, dependent upon local school requirements. Child assent was also obtained. The study protocol met the institutions' guidelines for protection of human subjects concerning their safety and privacy.

2.3. Conceptual framework

We based our analysis on the aforementioned social determinants of health conceptual framework developed by the CSDH (Fig. 1) (Solar and Irwin, 2010). This framework describes how inequalities in child health are structurally determined by variations in socio-economic and political context, and that these relationships are mediated in part by intermediary determinants. We hypothesized that spiritual health and its four domains act as intermediary determinants.

2.4. Key variables

Structural Determinant – Family Affluence. Individual material circumstances were assessed by the validated Family Affluence Scale (FAS III) (Hartley et al., 2016) which includes 6 items describing material conditions in households, including whether participants have their own bedroom, number of bathrooms in their primary residence, vehicle ownership, vacation travel outside of country, dishwasher ownership, and computer ownership. Responses are summed into a composite scale with a range of 0 (low affluence) to 13 (high affluence) (Hartley et al.,

2016).

Intermediary Psychosocial Determinant – Spiritual Health. Based on a published scale (Fisher, 2011), an optional spiritual health module was adapted for use in the HBSC in 2014 (Michaelson et al., 2016a), then updated and validated cross-nationally in 2018 (Shaver et al., 2020). Participants were asked to identify how important it is for them to: “feel that your life has meaning or purpose”; “experience joy (pleasure, happiness) in life” (connections to self); “be kind to other people”; “be forgiving of others”; “show respect for other people” (connections to others); “feel connected to nature”; “care for the natural environment” (connections to nature); “meditate or pray”; “feel a connection to a higher spiritual power”; “feel a sense of belonging to something greater than yourself” (connections to the transcendent). Response options followed a 5-point scale ranging from 0= “not at all important” to 4= “very important”, and summary scores were estimated. Cronbach alpha coefficients for the overall scale and in all four domains were acceptable (all >0.7), and confirmatory factor analysis showed that the module was best analyzed by domain (Shaver et al., 2020).

Primary Outcome – Positive Subjective Health Symptoms. The HBSC subjective health symptoms index (Heinz et al., 2022) documents the frequency of somatic and psychosocial symptoms that impair everyday function. Young people reported how often in the last 6 months (0= “rarely or never” to 4= “about every day”) they experienced: headache, stomachache, backache, feeling low, irritability or bad temper, feeling nervous, difficulties in getting to sleep, and feeling dizzy (Cronbach's $\alpha = 0.84$). Responses were summed to create a composite scale ranging from 0 to 32. Collectively, this scale measures a unidimensional latent trait of psychosomatic problems, an indicator of mental health. Low scores correlate strongly with indicators of positive mental health status and well-being (Garipey et al., 2016). Using item response theory and differential test functioning analysis conducted in 46 countries, this scale has been shown to represent a “consistent and reliable universal instrument” (Heinz et al., 2022). When reverse coded (Michaelson et al., 2021) and based on the highest quartile of this scale, we identified young people reporting states of positive levels of subjective health symptoms, our primary outcome.

Sex and Gender. Using a mandatory questionnaire item, participants reported whether they were a “boy” or “girl”, which was used as a primary stratification variable in all analyses. While this represents a binary categorization and could be interpreted as biological sex, the effects under study relate to gendered responses to socially constructed roles, behaviours, identities and cultural contexts, and less to do with biological sex or sex-at-birth. There is longstanding precedent within the HBSC network to use this item as a crude indicator of gender as opposed to sex, despite its limitations.

Additional Covariates. Students reported the date of survey completion and their month and year of birth, from which age was estimated.

2.5. Statistical analysis

Analyses were conducted in SAS Version 9.4 (SAS Institute, Cary, NC). We restricted the sample to students with complete data on all key variables. While some country samples were self-weighting, in others (Canada, England, Scotland, and Wales) a weighting variable was applied to ensure national representativeness.

The study sample was profiled demographically. We summarized average (mean, SD) values for core variables, including the FAS III scale, the spiritual health scale and its four domains, and the HBSC subjective health symptoms index. Descriptive analyses were stratified by gender and country. FAS III quartiles were also created using country-specific distributions.

Multivariable linear regression was used to examine potential associations according to the pathway implied by the CSDH model (Solar and Irwin, 2010). This included associations between: (1) FAS III (Hartley et al., 2016) (in quartiles) and the spiritual health scale, (2) the

spiritual health scale and positive levels of the subjective health complaints scale, and (3) FAS III (in quartiles) and positive levels of subjective health symptoms. All analyses were age-adjusted and stratified by gender and country. Effect sizes were described as beta coefficients. Each model was weighted and included a random school effect to account for clustering by school.

To further test the CSDH framework, we estimated the indirect, mediating effects of spiritual health (overall, and by domain) on associations between family affluence and positive levels of psychosomatic symptoms. We calculated the percentage of the total potential effect that was accounted for by each of the spiritual health domains by dividing the difference between the betas estimated with and without adjustment for each domain, divided by the beta estimated for each fully adjusted model ($\times 100\%$). We present results comparing the highest and lowest quartile for the FAS III scale. Models were stratified by gender and controlled for age.

Statistical power to detect socially meaningful effects varied within strata defined by country, gender, and domain, but was generally adequate (>80%).

3. Results

3.1. Description of the study population

Reports from 42,843 young people (21,007 boys, 21,836 girls) from eight countries were available. Participants are profiled in Table 1 by country, gender, and age group.

Table 2 describes survey responses according to core study variables. When stratified by gender, reported levels of family affluence were highest in England and Wales, with the lowest levels reported in Moldova. The highest overall spiritual health scores were reported in Canada and Moldova—increases driven by higher scores for three domains: connections to others, nature and the transcendent. In both boys and girls, scores for the perceived importance of connections to self were consistent across all countries. The lowest scores for spiritual health were reported in Scotland and Latvia, attributable to low scores for connections to nature and the transcendent (Scotland) and to others (Latvia). For subjective health symptoms, among boys the highest levels were reported in Canada and Lithuania, with the lowest levels reported in England and Poland. Among girls, the highest levels were reported in Lithuania and Moldova, with lowest levels reported in Poland.

3.2. Evaluation of the CSDH conceptual framework (Solar and Irwin, 2010)

We first examined associations between the FAS III and spiritual health (Table 3). In five of eight countries (Canada, Latvia, Lithuania, Scotland, and Wales), family affluence was positively associated with the overall spiritual health score. In two countries (England, Moldova) there was no significant pattern observed, and in Poland, an inverse association was found (boys only). We then examined these relationships by domain of spirituality. The most consistent pattern was with connections to self, with an association between higher family affluence and higher connections to self observed in seven of eight countries. An association between higher family affluence and higher connections to others was observed in five of eight countries, and between family affluence and higher connections to nature in five of eight countries (boys) and three of eight countries (girls). For connections to the transcendent, there was evidence of such associations in three of eight countries (boys) and four of eight (girls). There were exceptions. Among boys in Poland, as family affluence increased there was evidence of a correlated decline in connections to the transcendent. A similar pattern was seen in Moldova among girls.

The second step to consider was the association between spiritual health and positive levels of subjective health symptoms (Table 4). Overall, a strong protective association was identified in all eight

Table 1

Description of young people from eight countries (N = 42,843) who completed the 2018 HBSC spiritual health module by gender and age group.

	Canada	England	Scotland	Wales	Lithuania	Latvia	Moldova	Poland	Total
Boys, by age									
11	1079	515	/	2227	590	659	662	/	5732
13	1630	449	636	2302	611	707	717	782	7834
15	1515	342	587	2330	524	616	702	825	7441
Total	4224	1306	1223	6859	1725	1982	2081	1607	21,007
Girls, by age									
11	1078	464	/	2232	615	695	733	/	5817
13	1843	458	722	2259	546	688	669	850	8035
15	1688	345	660	2404	584	661	737	905	7984
Total	4609	1267	1382	6895	1745	2044	2139	1755	21,836

All values are weighted according to country-specific approach to weighting.

Table 2

Description of average family affluence, subjective health symptoms, and spiritual health reported by young people from eight countries (N = 42,843) by gender, 2018 HBSC Study.

	Canada		England		Scotland		Wales		Lithuania		Latvia		Moldova		Poland	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Boys																
Family affluence (0–13)	8.9	(2.3)	9.1	(2.3)	9.0	(2.3)	9.3	(2.3)	7.1	(2.5)	7.3	(2.5)	5.3	(2.8)	7.8	(2.3)
Subjective health symptoms (0–32)*	25.0	(5.9)	23.9	(5.6)	24.2	(6.2)	24.6	(6.2)	25.6	(5.9)	24.6	(6.4)	24.9	(6.3)	24.0	(5.8)
Overall spiritual health (0–40)	28.7	(8.1)	27.1	(7.7)	24.0	(8.3)	26.0	(7.7)	26.5	(7.8)	25.1	(7.9)	31.5	(8.6)	27.8	(7.0)
<i>Connections to...</i>																
Self (0–8)	6.7	(1.8)	6.7	(1.7)	6.2	(2.0)	6.6	(1.8)	6.8	(1.7)	6.5	(1.9)	7.0	(1.8)	6.4	(1.7)
Others (0–12)	10.0	(2.5)	9.8	(2.4)	9.2	(2.7)	9.7	(2.4)	9.6	(2.6)	8.5	(2.7)	10.1	(2.9)	9.4	(2.4)
Nature (0–8)	6.0	(2.0)	5.5	(2.2)	4.9	(2.4)	5.2	(2.2)	5.4	(2.3)	5.3	(2.2)	6.2	(2.1)	5.3	(1.9)
Transcendent (0–12)	6.0	(4.1)	5.2	(4.0)	3.7	(3.8)	4.5	(3.7)	4.7	(3.8)	4.8	(3.7)	8.3	(3.8)	6.7	(3.3)
Girls																
Family affluence (0–13)	8.9	(2.3)	9.1	(2.5)	9.0	(2.4)	9.2	(2.3)	6.8	(2.5)	7.2	(2.5)	4.9	(2.7)	7.8	(2.3)
Subjective health symptoms (0–32)*	21.4	(7.4)	21.1	(7.2)	20.5	(7.5)	21.8	(7.3)	22.6	(7.2)	21.2	(7.5)	22.9	(6.8)	20.4	(6.8)
Overall spiritual health (0–40)	30.2	(7.3)	28.1	(7.5)	26.4	(7.0)	27.2	(7.2)	28.8	(6.8)	26.2	(7.0)	33.1	(7.8)	28.7	(6.5)
<i>Connections to...</i>																
Self (0–8)	6.9	(1.7)	6.7	(1.8)	6.6	(1.7)	6.6	(1.8)	7.1	(1.5)	6.9	(1.7)	7.2	(1.7)	6.6	(1.7)
Others (0–12)	10.6	(2.0)	10.4	(2.1)	10.3	(1.9)	10.2	(2.0)	10.3	(2.1)	9.1	(2.4)	10.7	(2.4)	10.0	(2.1)
Nature (0–8)	6.4	(1.9)	5.7	(2.3)	5.3	(2.3)	5.4	(2.2)	6.0	(2.0)	5.5	(2.1)	6.4	(2.0)	5.5	(1.8)
Transcendent (0–12)	6.4	(3.9)	5.2	(3.9)	4.2	(3.6)	5.0	(3.5)	5.4	(3.7)	4.7	(3.4)	8.8	(3.4)	6.5	(3.2)

*Higher scores=more positive mental health; SD=Standard Deviation; All values are weighted according to country-specific approach to weighting.

countries for the overall spiritual health scale, and for connections to self, others, and nature. This association was stronger for girls compared to boys. Observed associations between connections to the transcendent and subjective health symptoms were inconsistent.

The final analytical step was to determine the percentage of the potential relationship between family affluence and positive levels of subjective health symptoms that was accounted for by the spiritual health measures (Table 5). In the four Western European countries, higher family affluence was correlated with positive levels of subjective health symptoms, and this was partially mediated by some aspect of spirituality. However, in the four Eastern European countries, higher family affluence was not associated with more positive levels of psychosomatic symptoms, and our findings sometimes supported an inverse relationship. Hence, there was no positive correlation for spiritual health or its domains to mediate in such contexts.

4. Discussion

This cross-national study explored the novel idea that spirituality could act as an intermediary determinant in conceptual frameworks examining determinants of mental health in child and adolescent populations. It yielded three main findings. *First*, family affluence, our available measure of socio-economic status, was consistently associated with higher levels of spiritual health. This was most notable for the domain “connections to self”, which includes indicators of “meaning,” “purpose,” and “joy” in life. *Second*, across all countries higher reported levels of spiritual health were associated with lower levels of subjective

health symptoms i.e., better mental health status in most countries. This potential effect was mainly driven by “connections to self” but was less consistent for “connections to the transcendent”. Our *third* finding gave us pause to consider what the CSDH framework makes clear: that the structural determinants of health are not just socio-economic in nature. Rather, people are situated in cultural, historical and political environments that provide important context for assessing health inequities (Solar and Irwin, 2010). In keeping with this thinking, we found inconsistent correlations between family affluence and positive levels of subjective health symptoms, with a clear Western-Eastern divide. Study findings supported the CSDH conceptual framework for determinants of health within the four Western Countries (Canada, England, Scotland, Wales,) but did not in the four Eastern European countries (Latvia, Lithuania, Moldova, Poland). In these countries, no association was demonstrated between family affluence and positive mental health status. Based on our reliance on measures of affluence as our primary structural determinant, it was therefore impossible for spiritual health to act as an intermediary determinant of health as per the CSDH framework (Solar and Irwin, 2010).

Our confirmation of associations between our measure of family affluence and higher levels of spiritual health aligns with foundational theory describing the social determinants of health. Here Marmot et al. (2010)-link the concepts of socioeconomic position, human “flourishing” and health, writing: “People with higher socioeconomic position in society have... more opportunities to lead a flourishing life. They also have better health (Marmot et al., 2010, p 3).” To that end, our findings further thinking around ways that socio-economic disadvantage could

Table 3
Adjusted betas examining the correlations between family affluence (highest vs lowest quartile) and spiritual health (overall and by domain) in young people from eight countries (N = 42,843) by gender, 2018 HBSC Study.

Country	Spiritual health			By domain															
	Full scale (0–40)			Self (0–8)				Others (0–12)				Nature (0–8)				Transcendent (0–12)			
	Boys	Girls	P	Boys	Girls	P	Boys	Girls	P	Boys	Girls	P	Boys	Girls	P	Boys	Girls	P	
Canada	1.49	<0.01	1.72	<0.01	0.50	<0.01	0.41	<0.01	0.42	<0.01	0.25	<0.01	0.25	<0.01	0.39	0.03	0.56	<0.01	
England	0.61	0.29	0.32	0.57	0.51	<0.01	0.26	0.14	0.42	<0.01	0.25	0.13	0.25	0.75	-0.19	0.52	-0.39	0.18	
Scotland	2.50	<0.01	1.69	<0.01	0.64	<0.01	0.67	<0.01	0.33	0.02	0.44	0.02	0.44	0.02	0.86	<0.01	0.45	0.08	
Wales	0.96	<0.01	0.97	<0.01	0.59	<0.01	0.28	<0.01	0.23	<0.01	0.15	0.04	0.15	0.04	0.06	0.64	0.12	0.27	
Lithuania	1.22	0.01	0.93	0.03	0.17	0.08	0.20	0.24	0.10	0.47	0.39	0.01	0.39	0.01	0.35	0.14	0.51	0.03	
Latvia	1.76	<0.01	1.72	<0.01	0.52	<0.01	0.55	<0.01	0.34	0.02	0.26	0.05	0.26	0.01	0.39	0.07	0.56	0.01	
Moldova	0.02	0.97	-0.62	0.16	0.04	0.69	0.03	0.20	-0.12	0.40	-0.05	0.70	-0.12	0.14	-0.12	0.58	-0.35	0.07	
Poland	-1.06	0.03	0.13	0.77	0.83	0.27	-0.16	0.33	-0.01	0.92	-0.20	0.13	-0.20	0.10	-0.66	<0.01	-0.20	0.34	

All models adjusted for age and clustering by school, and all values are weighted according to country-specific approach to weighting.

Table 4
Age adjusted betas examining associations between spiritual health (overall and domain scores) and subjective health symptoms (positive mental health; range = 0–32) in young people from eight countries (N = 42,843) by gender, 2018 HBSC Study.

Country	Spiritual health (0–40)			By domain														
	Self domain (0–8)			Others domain (0–12)				Nature domain (0–8)				Transcendent (0–12)						
	Boys	Girls	P	Boys	Girls	P	Boys	Girls	P	Boys	Girls	P	Boys	Girls	P			
Canada	0.13	<0.01	0.22	<0.01	0.80	<0.01	0.35	<0.01	0.60	<0.01	0.38	<0.01	0.45	<0.01	0.13	<0.01	0.22	<0.01
England	0.11	<0.01	0.14	<0.01	0.68	<0.01	0.45	<0.01	0.46	<0.01	0.30	<0.01	0.28	<0.01	0.02	0.57	0.03	0.57
Scotland	0.19	<0.01	0.19	<0.01	1.02	<0.01	0.51	<0.01	0.46	<0.01	0.48	<0.01	0.37	<0.01	0.20	<0.01	0.12	0.03
Wales	0.22	<0.01	0.28	<0.01	1.15	<0.01	0.60	<0.01	0.79	<0.01	0.51	<0.01	0.51	<0.01	0.19	<0.01	0.25	<0.01
Lithuania	0.16	<0.01	0.23	<0.01	0.97	<0.01	0.43	<0.01	0.61	<0.01	0.41	<0.01	0.45	<0.01	0.07	0.06	0.20	<0.01
Latvia	0.09	<0.01	0.21	<0.01	0.62	<0.01	0.24	<0.01	0.48	<0.01	0.41	<0.01	0.72	<0.01	-0.04	0.36	0.09	0.06
Moldova	0.11	<0.01	0.12	<0.01	0.58	<0.01	0.35	<0.01	0.32	<0.01	0.36	<0.01	0.34	<0.01	0.11	<0.01	0.15	<0.01
Poland	0.19	<0.01	0.24	<0.01	0.88	<0.01	0.47	<0.01	0.51	<0.01	0.59	<0.01	0.53	<0.01	0.19	<0.01	0.33	<0.01

All models adjusted for age and clustering by school, and all values are weighted according to country-specific approach to weighting.

Table 5
Associations between family affluence (highest vs lowest quartile) and subjective health symptoms (range = 0–32, higher scores = more positive mental health) with and without adjusting for spiritual health (by domain and overall) in young people from eight countries (N = 42,843) by gender, 2018 HBSC Study.

	Boys			Girls			Boys			Girls			Boys			Girls		
	beta	p	%med	beta	p	%med	beta	p	%med	beta	p	%med	beta	p	%med	beta	p	%med
	Canada						England						Scotland					
Unadjusted	1.53	<.01	/	0.99	<.01	/	2.10	<.01	/	1.83	<.01	/	1.50	<.01	/	2.06	<.01	
Adjusted for connections to:																		
Self (0–12)	1.19	<.01	22.2	0.31	.27	68.7	1.78	<.01	15.2	1.36	<.01	25.7	1.01	.03	68.7	1.28	.01	37.9
Others (0–8)	1.39	<.01	9.2	0.74	.01	25.3	1.89	<.01	10.0	1.66	<.01	9.3	1.18	.01	25.3	1.93	<.01	6.3
Nature (0–8)	1.43	<.01	6.5	0.87	<.01	12.1	2.00	<.01	4.8	1.83	<.01	0.0	1.30	.01	12.1	1.95	<.01	5.3
Transcendent (0–12)	1.48	<.01	3.3	0.87	<.01	12.1	2.13	<.01	−1.4	1.86	<.01	−1.6	1.33	.01	12.1	2.00	<.01	2.9
Spiritual health (0–40)	1.33	<.01	13.1	0.61	.03	38.4	2.05	<.01	2.4	1.84	<.01	−0.5	1.04	.03	38.4	1.76	<.01	14.6
	Wales						Latvia						Poland					
Unadjusted	1.22	<.01	/	1.14	<.01	/	0.81	0.04	/	0.26	0.55	/	−0.75	0.07	/	−1.12	.01	/
Adjusted for connections to:																		
Self (0–12)	0.67	<.01	45.1	0.30	.17	73.7	0.44	0.26	45.7	−0.33	0.44	227	−0.73	0.07	2.7	−1.42	<.01	−26.8
Others (0–8)	1.05	<.01	13.9	0.94	<.01	17.5	0.68	0.09	16.0	0.08	0.85	69.2	−0.69	0.09	8.0	−1.13	.01	−0.9
Nature (0–8)	1.15	<.01	5.7	1.11	<.01	2.6	0.69	0.08	14.8	0.05	0.91	80.8	−0.65	0.11	13.3	−1.19	.01	−6.3
Transcendent (0–12)	1.21	<.01	0.8	1.11	<.01	2.6	0.83	0.04	−2.5	0.21	0.64	19.2	−0.62	0.13	17.3	−1.05	.02	6.3
Spiritual health (0–40)	1.01	<.01	17.2	0.85	<.01	25.4	0.64	0.11	21.0	−0.12	0.78	146	−0.56	0.16	25.3	−1.17	.01	−4.5
	Lithuania						Moldova											
Unadjusted	−0.23	0.54	/	−0.18	0.69		−0.64	0.09	/	−0.51	0.18	/						
Adjusted for connections to:																		
Self (0–12)	−0.51	0.17	−122	−0.42	0.32	−133	−0.76	0.04	−18.8	−0.57	0.13	−11.8						
Others (0–8)	−0.34	0.37	−47.8	−0.28	0.52	−55.6	−0.63	0.09	1.6	−0.48	0.20	5.9						
Nature (0–8)	−0.41	0.28	−78.3	−0.25	0.57	−38.9	−0.61	0.10	4.7	−0.43	0.25	15.7						
Transcendent (0–12)	−0.26	0.50	−13.0	−0.31	0.49	−72.2	−0.61	0.10	4.7	−0.44	0.25	13.7						
Spiritual health (0–40)	−0.45	0.24	−95.7	−0.44	0.31	−144	−0.62	0.09	3.1	−0.43	0.25	15.7						

All models adjusted for age, and full sample models also adjusted for gender; %med = % mediated by the spiritual health variable(s)

manifest in terms of the unequal distribution of resources that are essential for positive health and flourishing. In children, such immaterial resources could include indicators of spirituality, and especially having a sense of meaning, purpose, and joy in life. Children who are socio-economically advantaged may have access to additional opportunities in life that create such experiences. Hence, observed disparities around spiritual health may represent an unrecognized source of health inequality. This interpretation is likely enhanced not only because of the unjust sociopolitical structures that lead to disadvantage for children who are socioeconomically at risk, but also because of the unfair advantage that socioeconomic position and the related distribution of health promoting, clinical and health systems resources provided for other children (Nixon, 2019).

Our second finding, that positive spiritual health and improved mental health status generally go together, is in keeping with our past Canadian and international research (Michaelson, 2021; Michaelson et al., 2016a; Shaver et al., 2020; Michaelson et al., 2016b; Michaelson et al., 2021). This potentially protective relationship appears to be driven by the domain “connections to self.” This finding, too, has implications for health equity research and associated determinants of health models. If indeed spiritual health is consistently protective yet is more readily accessible to children with better socio-economic positions, this could represent an important focus for intervention. While potentially accessible to all children irrespective of their background, setting a priority on engagement of young people in experiences that provide meaning, purpose, and joy in life may be overlooked as a potential source of health and among those who are materially disadvantaged. Our findings provide a reminder of the potential power of such experiences in fostering health and well-being among all children, and the social structures that facilitate such experience for some children and not others.

Our third finding relates to the CSDH conceptual framework that guided our analysis (Solar and Irwin, 2010). This framework is supported by past literature (Marmot, 2015; Solar and Irwin, 2010; WHO Commission on Social Determinants of Health, 2008; Viner et al., 2012) focused on the pathways that underlie socio-economic disparities in health. Our findings suggest that in some contexts, including Canada, England, Scotland, and Wales, spiritual health indeed acts as an intermediary determinant of health, as per the CSDH framework (Solar and Irwin, 2010). However, this finding was not universal, with a different pattern emergent in the Eastern European countries of Latvia, Lithuania, Moldova, and Poland. In these contexts, no clear relationship was identified between family affluence and reports of subjective health symptoms. Hence, there was no possibility that spiritual health could act as a mediator via the hypothesized economic pathway (Solar and Irwin, 2010). In such cultural contexts, perhaps political forces replace economic ones as primary structural determinants, or perhaps socio-economic pathways operate differently. In many Eastern European countries, families and young people rely on more informal exchanges and practices than is typical in Western economies (Pichler and Wallace, 2007; Morris and Polese, 2016). Unless social researchers pause and reflect upon the initial conditions for class formation in different countries, models describing economic determinants of health may be mis-specified. Such social contexts encompass “a broad set of structural, cultural and functional aspects of a social system” that, beyond simple economics, may have a powerful impact on people's health but tend to “elude quantification” (Solar and Irwin, 2010, p 25). Our findings draw attention to the need to consider nuanced measures of cultural context in social models if we are to truly understand underlying structural and intermediary determinants of health. Illustratively, indicators of social position such as the FAS III used in our analysis were developed mainly in the West and may not be nuanced enough to capture pathways that are operating within Eastern contexts. Beyond affluence, studies of such pathways need to incorporate nuanced measures of cultural and political context, and not always rely on socio-economic explanations of the health of populations.

Strengths of our study include its originality within the literature around the social determinants and around child spirituality. Our analysis involved a large sample of children from eight diverse countries, a standardized international data collection protocol, and a team with diverse histories and experiences. Our study builds on WHO-endorsed conceptual thinking (Solar and Irwin, 2010) and suggests practical potential points of intervention from clinical and public health perspectives in contexts where spiritual health was supported as an intermediary determinant. Weaknesses include the cross-sectional nature of the data, limiting temporality and causal inference (hence our intentional use of the words “association” and “correlation” to describe “potential effects” and relationships). Although psychometrically sound (Heinz et al., 2022), our analysis was also limited to a single outcome that serves as a proxy for mental health status. And finally, despite adherence to our international protocol, translation and back-translation processes from English could lead to interpretive differences that are not fully understood.

Implications of our study warrant comment. While often ignored by mainstream social research agenda, spirituality and its domains do seem to be protective of mental health status in child populations. Second, in Western countries our analysis showed that spirituality and its domains may indeed be operating as unrecognized intermediary determinants in models describing relationships between affluence and health, providing an important focus for intervention. Focusing on the unequal distribution of spirituality at a policy level should include consideration of both the tangible and “existential” (Dyar et al., 2022) resources that create a sense of meaning and purpose in life. Past research demonstrates the importance of context to understanding health inequities, including attention to the culture, political environment, and history of a society (WHO Commission on Social Determinants of Health, 2008; MEKN, 2007). Our study adds to this discussion, demonstrating that the universality of some social determinants of health models and the measures used in their evaluation require careful assessment across cultural and political contexts. Finally, our findings add to the idea that increased attention to a more equitable distribution of all resources, including non-material resources such as spirituality, provide a novel means to address health inequalities in child populations.

5. Conclusions

In this novel, cross-national study, we examined whether connections afforded by a healthy spirituality potentially act as unrecognized intermediary determinants in child populations, contributing to inequities in mental health. Spiritual health appears to act as an intermediary determinant of children's health in some Western countries. There is less evidence of such potential effects in Eastern countries. The universality of social determinants of health models and the measures used in their evaluation require assessment across cultural and political contexts. With new and emergent health concerns in a changing society, updated models of the determinants of health that consider the spiritual dimensions of health may have important implications for health equity.

Author contributions

VM conceptualized the study. NK and WP did the formal analysis, accessed and verified the underlying data, and created the figures and tables. VM, WP and NK wrote the original draft of the manuscript and supervised this analysis. NK performed all software coding. VM, NK, KS, AS-D, MM-C, KP, PG, JI and WP contributed to the investigation and reviewed and edited the manuscript. VM, KS, KP, PG, JI and WP acquired funding. NK, KS, JI and WP were responsible for data curation. VM, NK, KS, JI and WP had full access to all data in the study and were responsible for project administration. All authors had final responsibility for the decision to submit for publication. All authors meet the ICMJE recommended criteria for authorship.

Funding

Grant funding was provided by the: 1) Public Health Agency of Canada; 2) Canadian Institutes of Health Research (operating grant MOP341188 and Bridge Grant PAU-179794, CIHR Institute of Human Development, Child and Youth Health Early Career Support Bridge Funding Priority Announcement initiative); 3) NIH Health Scotland; 4) Medical Research Council, Scotland; Dr. Inchley is supported by the Medical Research Council (MC_UU12017/14) and the Chief Scientist Office (SPHSU14) of Scotland; 5) Lithuanian University of Health, and the WHO European Regional Office for Lithuania. The funding sources had no role in the design, collection, analysis, and analysis of the survey data on which this study is based.

Data sharing

The individual data collected for this study and the associated data dictionary defining each field in the set will be made available upon request to the International Coordinating Centre, Health Behaviour in School-aged Children (HBSC). HBSC collects anonymized data, hence the data made available will include deidentified participant data. Data can be obtained along with the associated study protocol and data dictionary after approval of a brief proposal sent to HBSC (see: <https://hbsc.org/contact/> for contact information; and <https://hbsc.org/data/> for the formal link and instructions to make this request for data access).

CRedit authorship contribution statement

Valerie Michaelson: Conceptualization, Project administration, Writing – original draft, Writing – review & editing, Funding acquisition, Investigation, Resources, Supervision. **Nathan King:** Data curation, Formal analysis, Investigation, Methodology, Software, Writing – original draft, Writing – review & editing. **Kastytis Šmigelskas:** Investigation, Methodology, Writing – review & editing, Data curation. **Agnė Slapsinskaitė Dackevičienė:** Investigation, Methodology, Writing – review & editing. **Marta Malinowska-Cieślak:** Investigation, Methodology, Writing – review & editing. **Karen Patte:** Investigation, Methodology, Writing – review & editing. **Pauli Gardner:** Investigation, Writing – review & editing. **Jo Inchley:** Data curation, Investigation, Methodology, Project administration, Writing – review & editing. **William Pickett:** Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Castellano, M.B., 2015. The spiritual dimension of holistic health: a reflection. In: Greenwood, M., De Leeuw, S., Lindsay, N.M. (Eds.), *Determinants of Indigenous peoples' Health in Canada: Beyond the Social*. Canadian Scholars Press, Toronto (ON), pp. 33–38.
- Cotton, S., Zebracki, K., Rosenthal, S.L., Tsevat, J., Drotar, D., 2006. Religion/spirituality and adolescent health outcomes: a review. *J. Adolesc. Health* 38 (4), 472–480. <https://doi.org/10.1016/j.jadohealth.2005.10.005>.
- Currie, C., Zanotti, C., Morgan, A., Currie, D., et al., 2009/2010. Social determinants of health and well-being among young people. *Health Behav. School-aged Child. (HBSC) Study: Intern. Report*.

- Dyar, O.J., Haglund, B.J., Melder, C., Skillington, T., Kristenson, M., Sarkadi, A., 2022. Rainbows over the world's public health: determinants of health models in the past, present, and future. *Scand. J. Public Health* 50 (7), 1047–1058. <https://doi.org/10.1177/14034948221113147>.
- Fisher, J., 2011. The four domains model: connecting spirituality, health and well-being. *Religions* 2 (1), 17–28. <https://doi.org/10.3390/rel2010017>.
- Frank, J., Abel, T., Campostrini, S., Cook, S., Lin, V.K., McQueen, D.V., 2020. The social determinants of health: time to re-think? *Int. J. Environ. Res. Public Health* 17 (16), 5856. <https://doi.org/10.3390/ijerph17165856>.
- Garipey, G., McKinnon, B., Sentenac, M., Elgar, F.J., 2016. Validity and reliability of a brief symptom checklist to measure psychological health in school-aged children. *Child Indic. Res.* 9 (2), 471–484. <https://doi.org/10.1007/s12187-015-9326-2>.
- Goldfeld, S., O'Connor, M., Cloney, D., et al., 2018. Understanding child disadvantage from a social determinants perspective. *J. Epidemiol. Community Health* 72 (3), 223–229. <https://doi.org/10.1136/jech-2017-209036>.
- Hartley, J.E., Levin, K., Currie, C., 2016. A new version of the HBSC family affluence scale-FAS III: Scottish qualitative findings from the international FAS development study. *Child Indic. Res.* 9 (1), 233–245. <https://doi.org/10.1007/s12187-015-9325-3>.
- Heinz, A., Sischka, P.E., Catunda, C., et al., 2022. Item response theory and differential test functioning analysis of the HBSC-symptom-checklist across 46 countries. *BMC Med. Res. Methodol.* 22 (1), 1–24.
- Inchley, J., Currie, D., 2016. Growing up Unequal: Gender and Socioeconomic Differences in Young People's Health and Well-Being. *Health Behaviour in School-aged Children (HBSC) Study: International Report from the 2013/2014 Survey*. World Health Organization.
- Krieger, J., Higgins, D.L., 2002. Housing and health: time again for public health action. *Am. J. Public Health* 92 (5), 758–768. <https://doi.org/10.2105/AJPH.92.5.758>.
- Marmot, M., 2015. The health gap: the challenge of an unequal world. *Lancet* 386 (10011), 2442–2444. [https://doi.org/10.1016/S0140-6736\(15\)00150-6](https://doi.org/10.1016/S0140-6736(15)00150-6).
- Marmot, M., Allen, J., Goldblatt, P., et al., 2010. Fair society, healthy lives: The Marmot review executive summary. In: *Strategic review of health inequalities in England post-2010*. Institute of Health Equity [cited 2022 Nov 5]. Available from: <https://www.instituteofhealthequity.org/resources-reports/fair-society-healthy-lives-the-marmot-review/fair-society-healthy-lives-full-report-pdf.pdf>.
- MEKN, 2007. The social determinants of health: Developing an evidence base for political action. In: *Final Report of the Measurement and Evidence Knowledge Network of the Commission on Social Determinants of Health*. World Health Organization, Geneva.
- Michaelson, V., 2021. Developing a definition of spiritual health for Canadian young people: a qualitative study. *Intern. J. Children's Spiritual.* 26 (1–2), 67–85.
- Michaelson, V., Brooks, F., Jirásek, I., et al., 2016a. Developmental patterns of adolescent spiritual health in six countries. *SSM-population health* 2, 294–303. <https://doi.org/10.1016/j.ssmph.2016.03.006>.
- Michaelson, V., Freeman, J., King, N., et al., 2016b. Inequalities in the spiritual health of young Canadians: a national, cross-sectional study. *BMC Public Health* 16 (1), 1–9.
- Michaelson, V., King, N., Patte, K.A., Gardner, P., Pickett, W., 2023. Connections associated with a healthy spirituality: are these unrecognized intermediary determinants that shape health inequities in Canadian young people? *BMC Public Health* 23 (1), 1–10.
- Michaelson, V., Smigelskas, K., King, N., Inchley, J., Malinowska-Ciesliki, M., Pickett, W., 2021. Domains of spirituality and their importance to the health of 75 533 adolescents in 12 countries. *Health Promot. Int.* 13, daab185. <https://doi.org/10.1093/heapro/daab185>.
- Morris, J., Polese, A. (Eds.), 2016. *The Informal Post-Socialist Economy: Embedded Practices and Livelihoods*. Routledge, Milton Park, Oxfordshire.
- Nixon, S.A., 2019. The coin model of privilege and critical allyship: implications for health. *BMC Public Health* 19 (1), 1–3.
- Pichler, F., Wallace, C., 2007. Patterns of formal and informal social capital in Europe. *Eur. Sociol. Rev.* 23 (4), 423–435. <https://doi.org/10.1093/esr/jcm013>.
- Shaver, N., Michaelson, V., Whitehead, R., Pickett, W., Brooks, F., Inchley, J., 2020. Structural validity of a brief scale adapted to measure adolescent spiritual health. *SSM-Popul. Health* 12, 100670. <https://doi.org/10.1016/j.ssmph.2020.100670>.
- Solar, O., Irwin, A., 2010. A Conceptual Framework for Action on the Social Determinants of Health: Social Determinants of Health Discussion Paper 2. (Policy and Practice). Geneva [cited Nov 5 2022]. Available from: <https://apps.who.int/iris/bitstream/handle/10665/44489/?sequence=1>.
- Thornton, R.L., Yang, T.J., 2022. Addressing population health inequities: investing in the social determinants of health for children and families to advance child health equity. *Curr. Opin. Pediatr.* 27, 10–97.
- Viner, R.M., Ozer, E.M., Denny, S., et al., 2012. Adolescence and the social determinants of health. *Lancet* 379 (9826), 1641–1652. [https://doi.org/10.1016/S0140-6736\(12\)60149-4](https://doi.org/10.1016/S0140-6736(12)60149-4).
- WHO Commission on Social Determinants of Health, 2008. *Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health: Commission on Social Determinants of Health Final Report*. World Health Organization.