RESEARCH ARTICLE

Investigating Mental Fitness and School Connectedness in Prince Edward Island and New Brunswick, Canada

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—————————————— ABSTRACT ——————————————

BACKGROUND: As youth struggle with anxiety and depression, promoting positive mental fitness is a primary concern. Canadian school-based mental health programs that focus on positive psychology and positive mental health initiatives emphasize safe and supportive environments, student engagement, resilience, and self-determination. This study examined predictors of mental fitness and its 3 components (autonomy, competence, and relatedness).

METHODS: School Health Action Planning and Evaluation System-Prince Edward Island (SHAPES-PEI) and the New Brunswick Student Wellness Survey (NB SWS) are data collection and feedback systems that survey youth about 4 health behaviors. Grade 7-12 students in Prince Edward Island (N = 3318) and New Brunswick (N = 7314) completed a mental fitness questionnaire in 2008-2009 (PEI) and 2006-2007 (NB). Four linear regression models were conducted to examine student characteristics associated with mental fitness, autonomy, competence, and relatedness.

RESULTS: Positive associations were found between school connectedness (p < .0001) and mental fitness, as well as autonomy, competence, and relatedness. There were also significant relationships between affect, pro-social and antisocial behaviors, tried smoking, and mental fitness.

CONCLUSION: A better understanding of adolescent health and its predictors is needed. By identifying core parameters for mental fitness, we can inform how to address students' needs through appropriate programs and policies supporting healthy school environments.

Keywords: mental health; predictors of mental fitness; school connectedness.

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As schools, communities, and society struggle to understand how to support children and youth dealing with stress, depression, and other mental health challenges, there is a need to improve understanding of the environment and relational factors that influence them. The Mental Health Commission of Canada (MHCC) has undertaken a number of initiatives to address child and youth mental health, including the development of the Evergreen Framework.[1] This framework aims to provide information that can guide the mandate of the MHCC as well as strategic directions to those working in the area. Other policy and research work has examined mental health in school settings[2] and

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the impact on health outcomes.[3-5] Some Canadian school-based mental health programs focus on positive psychology and positive mental health, rather than using an illness-based approach.[6,7] These initiatives emphasize health promotion and illness prevention strategies including safe and supportive environments, student engagement/empowerment, resilience, and self-determination. Morrison et al[8] describe mental fitness as students' capacity to be self-determined, to think about, plan, and act on personal decisions that contribute to emotional, social, and physical development. They suggest that mental fitness has been shown to be associated with student attitudes and behaviors, including positive and negative affect, pro-social and oppositional behaviors, and tobacco use.[8] They developed a mental fitness survey module based on positive psychology approaches, particularly the work of Deci and Ryan[9,10] who stress the importance of autonomy, competence, and relatedness as core psychological needs.

School connectedness also has attracted increased attention in recent years. The Wingspread Declaration on School Connections[11] suggests that students who feel connected to school are more likely to succeed. A publication produced by the Center for Disease Control and Prevention, based on the Wingspread Declaration on School Connections and a review of this literature, presents evidence-based strategies that schools can implement to increase school connectedness.[12]

Research shows correlations between school connectedness and various student health behaviors, including physical activity,[13] anger, and harassment,[14,15] and health-risk behavior generally (eg, drug use and violence).[16-20] Studies examining the relationship between school connectedness and mental health have focused on the impact of school connectedness on mental illnesses or on levels of stress and self-esteem.[21-24] The relationship between school connectedness and mental fitness has not been explored thoroughly. In a review of literature, Waters et al[25] identified existing frameworks that aim to promote positive student health and well-being. To address limitations of this frameworks, particularly lack of inclusion of school connectedness and how it relates to health outcomes of students, they present a theoretical model proposing an association between connectedness and the mental fitness components of autonomy, competence, and relatedness.[25] Waters et al[25] suggest that school connectedness is "the extent to which students feel autonomous yet supported, competent in all they attempt and related to adults and peers." They also identify that connectedness extends beyond the individual and is influenced by the built environment. They propose that the mental fitness component of their connectedness framework has been neglected, resulting in a failure to identify mental fitness as an important aspect of how the school environment influences youth health. The purposes of this study were (1) to examine previously identified indicators (school connectedness, pro-social and antisocial behaviors, positive and negative affect, and smoking),[8,14-20] to improve understanding of their relationships with mental fitness and its 3 components (autonomy, competence, and relatedness); and (2) to expand on the limited understanding of mental fitness.

METHODS

Design

The School Health Action Planning and Evaluation System-Prince Edward Island (SHAPES-PEI) and the New Brunswick Student Wellness Survey (NB SWS) are data collection and feedback systems that collect evidence from a population of interest, then provide information to stakeholders to inform actions, including programs and interventions.[26,27] Both provincial surveillance systems include self-report questionnaires that ask questions regarding 4 main health behaviors (healthy eating, physical activity, tobacco use, and mental fitness). The questionnaires were completed by grade 5-12 students in PEI and grade 6-12 students in NB. Active information with active consent was used for students under the age of 14 whereas active information with passive consent was used for students 14 years of age and older. Questionnaires were administered by teachers during class time and students were not provided compensation. In the 2008-2009 school year, 58 of 68 (85%) all eligible schools in PEI participated. In 2006-2007, 184 of 212 (87%) eligible schools participated in the NB SWS. Additional details on the SHAPES-PEI and NB SWS methods and design are available online at http://www.upei.ca/cshr/SHAPES and http://www.unbf.ca/education/herg/wellness/index.php.

Participants

Only the responses from students in grades 7-12 were included in this study. In PEI, 3318 students completed a SHAPES-PEI survey, whereas in NB, 7314 students participated.

Measures

Unless otherwise stated, all variables for both PEI and NB samples were constructed in the same manner. The measures used in this manuscript are consistent with past research and have been validated previously in youth samples.[16,20,28-32]

Outcomes. The mental fitness scale was based on the Children's Intrinsic Needs Satisfaction Scale (CINSS).[28] Students were asked 18 questions about how they feel they are perceived by their peers, teachers, parents, etc, whether they feel they have choices and can express themselves, and their own perceptions of themselves

and their abilities. Possible responses were coded on a 4-point scale ranging from ''really false for me'' to ''really true for me.'' Responses were summed to create a mental fitness score with a range from 0 to 54. Principal components analysis (PCA) was used to identify the 3 subscales of mental fitness (autonomy, competence, and relatedness).[29] One factor emerged from the PCA confirming the presence of 3 subscales. Each scale of autonomy, competence, and relatedness ranged from 0 to 18.

Demographics. Grade level was dichotomized into junior high (grades 7-9) or high school (grades 10-12) with high school coded as 1 (junior high = 0). Girls were coded as 1 (boys = 0). The logged median household income, based on the postal code of the student's school, was obtained from 2006 census data.

Student characteristics. The school connectedness variable is based on the construct developed by Resnick et al.[20] Responses were coded on a 4-point scale from ''strongly agree'' to ''strongly disagree'' and were reverse coded so that higher scores on the scale (0-15) represented a higher level of school connectedness.[16]

The positive and negative affect scales used were based on the positive and negative affect schedule for children (PANAS-C).[30] Students were presented with a list of 6 positive and 6 negative emotions and asked to indicate the extent to which they felt each during the past week. The answers were based on a 5-point scale, ranging from ''very slightly or not at all'' to ''extremely'' (0-24) with higher scores reflecting higher levels of positive or negative emotions.

The pro-social behavior scale, based on the altruistic pro-social behavior subscale,[31] was comprised of 5 questions regarding engaging in behaviors voluntarily and not for the purposes of personal gain. The responses were based on a 6-point scale from ''definitely not like me'' to ''definitely like me'' and ranged from 0 to 25. Higher scores reflected engaging in more pro-social behaviors.

The antisocial behavior scale was based on the responses to 7 questions about oppositional behaviors. Items for this scale were based on a variety of comparable behavior scales.[31-33] Answers were scored on a 6-point scale from ''definitely not like me'' to ''definitely like me'' and responses were coded so that higher scores reflected engaging in more antisocial behaviors (0-35). In addition, students were asked if they ''ever tried cigarette smoking, even just a few puffs'' (yes = 1).

Data Analyses

Four linear regression models were conducted to examine student characteristics associated with (1) mental fitness, (2) autonomy, (3) competence, and (4) relatedness. The statistical package SAS 9.2 (2001) was used for all analyses (SAS Institute Inc., Cary,

Table 1. Prince Edward Island (PEI) and New Brunswick (NB) Variable Descriptive Elements

Variable	PEI 2008-2009 (N = 3318) Percentage (N) or Mean (SE)	NB 2006 (N = 7314) Percentage (N) or Mean (SE)
Outcomes		
Mental fitness	39.54 (0.19)	39.44 (0.15)
Autonomy	13.00 (0.07)	12.86 (0.06)
Competence	13.41 (0.07)	13.45 (0.05)
Relatedness	13.06 (0.07)	13.08 (0.05)
Predictors		
Sex (girl)	45.8% (N = 1637)	49.98% (N = 3557)
Grade (high school: 10-12)	52.9% (N = 1682)	49.09% (N = 4135)
Tried smoking (yes)	31% (N = 1002)	31.80% (N = 2423)
Median income	10.72 (0.001) logged	9.98 (0.002) logged
School connectedness	9.71 (0.06)	9.76 (0.06)
Positive affect	15.44 (0.11)	15.41 (0.09)
Negative affect	4.20 (0.09)	4.81 (0.07)
Pro-social behavior	12.94 (0.12)	14.79 (0.11)
Antisocial behavior	4.77 (0.13)	4.83 (0.09)

NC). PROC GENMOD was used to construct the linear regression models using the generalized estimating equations (GEEs) method to deal with potential correlation of data within schools.[34,35]

RESULTS

The variable descriptive elements for PEI and NB are shown in Table 1. In PEI, 46% of the sample was female, and 50% of the sample in NB was female. Students in high school (10-12) accounted for 53% of PEI students and 49% of NB students. The average mental fitness score for PEI students was 39.5, with NB students averaging 39.4. There were moderate correlations between school connectedness and mental fitness in both PEI (r = .44) and NB (r = .41).

Model 1 — Mental Fitness

For PEI, higher levels of mental fitness were associated with girls (1.41, p < .0001), in high school (1.51, p < .0001), and schools in communities with higher median income (5.42, p < .0001) (Table 2). Higher mental fitness was also associated with students with higher school connectedness (0.71, p < .0001), higher positive affect (0.50, p < .0001), and higher pro-social behaviors (0.16, p < .0001). Conversely, lower mental fitness was associated with students who had tried smoking (−1.27, p < .0001), had higher negative affect (−0.33, p < .0001), and higher anti-social behaviors (−0.20, p < .0001).

In NB, all variables were significantly related to mental fitness, except for median income. Higher levels of mental fitness were associated with girls (1.19, p < .0001) in high school (1.27, p < .0001) with a higher level of school connectedness (0.58,

Table 2. **Model 1 — Parameter Estimates (95% CI) for Mental Fitness**

Variable	PEI	NB
Sex (girl = 1)	1.41 (0.66 to 2.15)***	1.19 (0.62 to 1.75)***
Grade (high school = 1)	1.51 (0.77 to 2.25)***	1.27 (0.68 to 1.85)***
Tried smoking (yes = 1)	−1.27 (−1.82 to −0.72)***	−0.81 (−1.48 to −0.14)*
Median income	5.42 (2.07 to 8.77)***	0.32 (−1.30 to 1.95)
School connectedness	0.71 (0.57 to 0.86)***	0.58 (0.45 to 0.71)***
Positive affect	0.50 (0.44 to 0.56)***	0.49 (0.42 to 0.56)***
Negative affect	−0.33 (−0.42 to −0.25)***	−0.32 (−0.04 to −0.24)***
Pro-social behavior	0.16 (0.10 to 0.21)***	0.19 (0.13 to 0.25)***
Antisocial behavior	−0.20 (−0.26 to −0.14)***	−0.24 (−0.30 to −0.18)***

CI, confidence interval; NB, New Brunswick; PEI, Prince Edward Island.
*p < .05, **p < .001, ***p < .0001.

Table 3. **Model 2 — Parameter Estimates (95% CI) for Autonomy**

Variable	PEI	NB
Sex (girl = 1)	0.55 (0.26 to 0.85)***	0.51 (0.26 to 0.76)***
Grade (high school = 1)	0.85 (0.0.60 to 1.10)***	0.81 (0.55 to 1.08)***
Tried smoking (yes = 1)	−0.02 (−0.25 to −0.22)	0.11 (−0.19 to 0.40)
Median income	1.23 (0.08 to 2.38)*	−0.07 (−0.80 to 0.66)
School connectedness	0.24 (0.18 to 0.29)***	0.20 (0.15 to 0.25)***
Positive affect	0.18 (0.16 to 0.21)***	0.17 (0.14 to 0.20)***
Negative affect	−0.12 (−0.16 to −0.09)***	−0.13 (−0.16 to −0.10)***
Pro-social behavior	0.03 (0.01 to 0.05)**	0.05 (0.03 to 0.08)***
Antisocial behavior	−0.02 (−0.04 to 0.01)	−0.05 (−0.07 to −0.02)***

CI, confidence interval; NB, New Brunswick; PEI, Prince Edward Island.
*p < .05; **p < .001; ***p < .0001.

p < .0001), positive affect (0.49, p < .0001), and pro-social behaviors (0.19, p < .0001). Lower mental fitness levels were associated with students who had tried smoking (−0.81, p < .05), had higher negative affect (−0.32, p < .0001), and engaged in more anti-social behaviors (−0.24, p < .0001).

Model 2 — Autonomy

In the PEI autonomy model, being female (0.55, p < .0001), in high school (0.85, p < .0001) having median income (1.23, p < .05), school connectedness (0.24, p < .0001), positive affect (0.18, p < .0001), negative affect (−0.12, p < .0001), and pro-social behavior (0.03, p < .001) were significantly associated with autonomy (Table 3). Whereas ''tried smoking'' and engaging in antisocial behaviors were not significantly related to autonomy, the relationship remained negative. In the NB autonomy model, all variables, with the exception of ''tried smoking'' and median income, remained significantly related to autonomy.

Model 3 — Competence

In the PEI competence model, all variables except for sex and grade were strongly associated with competence (Table 4). Income (2.14, p < .001), school

Table 4. **Model 3 — Parameter Estimates (95% CI) for Competence**

Variable	PEI	NB
Sex (girl = 1)	0.29 (−0.03 to 0.61)	0.12 (−0.09 to 0.34)
Grade (high school = 1)	0.24 (−0.05 to 0.54)	0.29 (0.07 to 0.51)*
Tried smoking (yes = 1)	−0.75 (−1.00 to −0.51)***	−0.56 (−0.81 to −0.31)***
Median income	2.14 (0.80 to 3.49)**	0.08 (−0.58 to 0.73)
School connectedness	0.23 (0.18 to 0.27)***	0.17 (0.12 to 0.22)***
Positive affect	0.18 (0.15 to 0.20)***	0.19 (0.16 to 0.21)***
Negative affect	−0.14 (−0.17 to −0.11)***	−0.12 (−0.15 to −0.09)***
Pro-social behavior	0.07 (0.04 to 0.09)***	0.06 (0.04 to 0.08)***
Antisocial behavior	−0.08 (−0.11 to −0.06)***	−0.09 (−0.11 to −0.06)***

CI, confidence interval; NB, New Brunswick; PEI, Prince Edward Island.
*p < .05, **p < .001, ***p < .0001.

connectedness (0.23, p < .0001), positive affect (0.18, p < .0001), and pro-social behaviors (0.07, p < .0001) were significantly and positively associated with competence; ''tried smoking'' (−0.75, p < .0001), negative affect (−0.14, p < .0001), and antisocial behaviors (−0.08, p < .0001) were negatively associated with competence.

In NB, lower competence was strongly associated with, ''tried smoking'' (−0.56, p < .0001), negative affect (−0.12, p < .0001), and antisocial behaviors (−0.09, p < .0001). Competence was positively associated with grade (0.29, p < .05), school connectedness (0.17, p < .0001), positive affect (0.19, p < .0001), and pro-social behaviors (0.06, p < .0001).

Model 4 — Relatedness

PEI results were similar to the mental fitness model with all variables demonstrating significant relationships with relatedness (Table 5). In NB, grade did not appear to be significantly associated with relatedness. Relatedness was strongly associated with girls (0.53, p < .0001), having high levels of school connectedness (0.21, p < .0001), positive affect (0.12, p < .0001), and pro-social behaviors (0.07, p < .0001). Relatedness was negatively, significantly associated with ''tried smoking'' (−0.36, p < .05), negative affect (−0.07, p < .0001), and antisocial behaviors (−0.11, p < .0001).

DISCUSSION

Researchers, policymakers, and practitioners in the education system have identified mental health as an ongoing challenge. The strong influence of all predictors on student mental fitness suggests that a better understanding of adolescent mental health and its predictors is needed. By identifying core parameters for mental fitness, we can how address students' needs through appropriate programs and policies supporting healthy school environments.

Although the results from both PEI and NB were similar, the unique difference between them was that

Table 5. Model 4—Parameter Estimates (95% CI) for Relatedness

Variable	PEI	NB
Sex (girl = 1)	0.56 (0.33 to 0.80)***	0.53 (0.34 to 0.73)***
Grade (high school = 1)	0.40 (0.10 to 0.69)**	0.18 (−0.02 to 0.37)
Tried smoking (yes = 1)	−0.53 (−0.78 to −0.28)***	−0.36 (−0.58 to −0.15)*
Median income	1.98 (0.09 to 3.87)*	0.34 (−0.23 to 0.90)
School connectedness	0.25 (0.20 to 0.30)***	0.21 (0.16 to 0.25)***
Positive affect	0.14 (0.12 to 0.16)***	0.12 (0.11 to 0.15)***
Negative affect	−0.07 (−0.09 to −0.04)***	−0.07 (−0.09 to −0.04)***
Pro-social behavior	0.05 (0.03 to 0.08)***	0.07 (0.05 to 0.09)***
Antisocial behavior	−0.10 (−0.12 to −0.08)***	−0.11 (−0.13 to −0.08)***

CI, confidence interval; NB, New Brunswick; PEI, Prince Edward Island.
*p < .05, **p < .001, ***p < .0001.

median income was a significant predictor of mental fitness for students in PEI, but not for NB students. This finding cannot be explained based on our discussions with colleagues from each province. Median income was determined from census information based on each school's postal code. In some locations students do not live within the same area as the school, and therefore, the median income does not necessarily reflect the income of students' families. Further research is needed.

Whereas Ryan and Deci[36] posit that the basic needs of autonomy, competence, and relatedness apply to all individuals regardless of sex, age, and ethnicity, there are environmental factors that can influence individual experiences of these basic needs. Examining how school connectedness, positive/negative affect, and pro-social/antisocial behaviors influence mental fitness will help understand how to increase mental fitness and meet these needs. The results for both PEI and NB show strong relationships among school connectedness, affect, pro-social/antisocial behavior and mental fitness, which support previous research.[10] In all models for both provinces, school connectedness was positively associated with mental fitness and each of the 3 components (autonomy, competence, and relatedness), providing support for consideration of school connectedness when targeting students' mental fitness. Taking these findings to the level of intervention development will require identification of initiatives that can be tested in practice.

Of particular interest are the strong relationships among sex and grade and mental fitness for both provinces. That high school girls were found to have higher levels of mental fitness is an important consideration for planning and implementing interventions, and lends itself to the possibility of sex and grade specific programs. Consistent with previous studies,[8,9] core psychological needs should be integrated into programs and policies for adolescents. Because of sex differences, consideration of establishing targeted programming also might be explored.

Further, the findings suggest that grade and sex do not significantly influence competence levels of students in PEI. Previous research has found differences in competence beliefs between sex and grades when the competence measure has been broken down into specific areas such as academics, sports, social, etc.[37] It is possible that the competence measure for this study asked questions that were too general. Jacobs et al[37] have found nonlinear relationships between grade and competence suggesting that the relationship in the current study may not be adequately captured by the method used. ''One-size-fits-all'' interventions are not viable for helping students from differing grades address issues of mental health. The results from this study suggest that sex and grade differences be considered when identifying new interventions.

Interesting differences begin to emerge when examining the relationships between students' attitudes and behaviors and the 3 subcomponents of mental fitness. Students who have tried smoking have significantly lower levels of mental fitness in all models except for autonomy in both provinces. Although the relationship remained negative, ''tried smoking'' was not significantly related to autonomy. This is possibly due to youth choosing to try smoking as a means to achieve independence.[38] For these students, the use of tobacco may be perceived as a way to enhance their sense of autonomy.

Limitations

This study has several limitations common to self-report surveys conducted with youth. These may bias the association of school connectedness and mental fitness. Student responses could be inaccurate due to students purposely answering incorrectly, as a result of students' comprehension of questions asked, and mistakes with memory recall. Also, the data used were cross-sectional and therefore no causal inferences can be made about the relationships.

Conclusion

To our knowledge, this is the first study to examine mental fitness in adolescents across 2 provincial jurisdictions. Further study is required to explore the findings within larger jurisdictions and across more diverse provincial settings. Additionally more studies are needed to develop, implement, and test interventions to enhance adolescent mental fitness.

IMPLICATIONS FOR SCHOOL HEALTH

Mental fitness has the potential to be developed as an underlying theory that represents the core psychological needs of adolescents. Further exploration and testing of the core concepts of mental fitness across

diverse school jurisdictions is important to refinement and understanding of this novel approach to upstream thinking about students' mental health needs. Findings from this study, although exploratory, point to the need to advance school-based programming to include the concept of mental fitness more fully, as well as mental fitness assessments and integration of policies and programs that address mental fitness for adolescents.

Human Subjects Approval Statement

This study was approved by the Research Ethics Boards at the University of Prince Edward Island and the University of New Brunswick and individual school boards.

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