HHS Public Access

Author manuscript

Fam Community Health. Author manuscript; available in PMC 2020 January 01.

Published in final edited form as:

Fam Community Health. 2019 ; 42(1): 1–7. doi:10.1097/FCH.0000000000000205.

The impact of individual and parental American Indian boarding school attendance on chronic physical health of Northern Plains Tribes

Ursula Running Bear, PhD[a], **Zaneta M. Thayer, PhD**[b], **Calvin D. Croy, PhD**[a], **Carol E. Kaufman, PhD**[a], **Spero M. Manson, PhD**[a], and **the AI-SUPERPFP Team**[*]

[a]University of Colorado Anschutz Medical Campus, Centers for American Indian and Alaska Native Health, Colorado School of Public Health, Mail Stop F800, Nighthorse Campbell Native Health Building, 13055 E. 17th Avenue, Aurora, CO 80045, United States of America

[b]Department of Anthropology, Dartmouth College, Hinman Box 6047, Hanover, NH 03755, United States of America

Introduction

An association has become increasingly clear between the experience of historical trauma and the physical and psychological health of victimized populations.[1,2] Physical and psychological stressors that originate from the social environment generate a vulnerability to disease; these stressors, in turn, act as mechanisms that directly affect the biological systems of the body.[1] An American Indian (AI) specific chronic disease disparities model views historical traumas, such as colonization, war/battles, and genocide, as critical factors that impact the current AI health. The model also asserts that AI boarding school attendance is a major contributor to the increased prevalence of chronic diseases in this population.[3] This same view posits an intergenerational course for chronic disease disparities in which an AI child's experience of stressful boarding school life carries forward to adulthood and negatively affects subsequent offspring.[3]

Compulsory boarding school policies dating to 1891,[4] required children 7 and older to attend; those younger than 7 were often removed from their homes.[5] Boarding schools, especially in the Northern Plains (NP), were seen as a means of eradicating the AI way of life while simultaneously instilling European dress, norms, use of the English language, and Christianity.[6] Boarding school rules were often enforced through corporal punishment which could be harsh and severe including solitary confinement, flogging, withholding food, and whipping.[7] Unsanitary and overcrowded living conditions were widespread.[8] Poor diets high

Corresponding Author: Ursula Running Bear, PhD, University of Colorado Anschutz Medical Campus, Centers for American Indian and Alaska Native Health, Colorado School of Public Health, Mail Stop F800, Nighthorse Campbell Native Health Building, 13055 E. 17th Avenue, Aurora, CO 80045, United States of America, 303-724-1452, Ursula.RunningBear@ucdenver.edu.

[*]The AI-SUPERPFP team includes Cecelia K. Big Crow, Dedra Buchwald, Buck Chambers, Michelle L. Christensen, Denise A. Dillard, Karen DuBray, Paula A. Espinoza, Candace M. Fleming, Ann Wilson Frederick, Joseph Gone, Diana Gurley, Lori L. Jervis, Shirlene M. Jim, Suzell A. Klein, Ellen M. Keane, Denise Lee, Spero Manson, Monica C. McNulty, Denise L. Middlebrook, Christina M. Mitchell, Laurie A. Moore, Tilda D. Nez, Ilena M. Norton, Douglas K. Novins, Theresa O'Nell, Heather D. Orton, Carlette J. Randall, Angela Sam, James H. Shore, Sylvia G. Simpson, Paul Spicer, Nancy Rumbaugh Whitesell, and Lorette L. Yazzie.

Disclosures: There are no author disclosures relevant to this submission.

in starch and sugar, and low in fresh fruits and vegetables were common.[8] Physical, sexual, and emotional abuses were frequently reported.[5,6,9] The policy often impacted several generations. Children of the first attendees of boarding school went on to attended, as did their grandchildren, and great grandchildren leading to an intergenerational pattern of cultural and familial disruption (Brave Heart, Chase, Elkins, & Altschul, 2011). These circumstances remained unchanged for more than eighty years.[10]

Few studies have examined the physical health impacts of boarding school attendance on AI health. Three reports over the last two decades revealed that AI and Canadian Aboriginal boarding school attendees have poorer physical health status compared to their counterparts who did not attend boarding school.[11–13] One of these studies also investigated chronic diseases evident in the medical records of a small sample of Canadian Aboriginal boarding school attendees.[12] Compared to non-attendees, they had higher rates of diabetes, chronic obstructive pulmonary disease, hypertension, and chronic back and neck pain.[12] The small sample size may have lacked sufficient statistical power to detect significant differences between the two groups.[12] This body of work is the first to systematically investigate the relationship of physical health and boarding school attendance. The companion literature is still nascent with respect to the intergenerational impacts of boarding school attendance and AI health.

Inquiry into the intergenerational impacts of boarding school attendance among AIs has been limited to the psychological consequences of future generations.[14,15] Examples include increased suicidal thoughts and attempts,[15] and self-reported depressive symptoms.[14] Though these studies focus exclusively on the psychological sequelae of boarding school attendance, they set the stage for examining more deeply the attendant physical health affects.

Drawing upon these studies as a basis for our work, we examined the relationship between boarding school attendance and the number of chronic physical health conditions experienced by AIs who participated in a large scale community-based psychiatric epidemiological study in the NP.[16] We hypothesized that participant boarding school attendance (controlling for father's attendance, mother's attendance, demographics, number of mental health disorders, and health-related quality of life) would be associated with an increased number of physical health conditions compared to those without a personal history of boarding school attendance. We then explored the relationship between the participant's boarding school attendance and the 15 chronic health conditions that formed the count of the number of physical health conditions, controlling for the same variables noted above. This is the first study to systematically and quantitatively examine the relationship between AI boarding school attendance and the number of physical health conditions diagnosed by a doctor and specific chronic health conditions, while also controlling for parental attendance in a large sample.

Methods

Data

Data from 1,638 participants, collected from 1997 to 1999 as part of the American Indian Service Utilization, Psychiatric Epidemiology, Risk and Protective Factors Project (AI-SUPERPFP), were used in these analyses. Detailed descriptions of AI-SUPERPFP are provided elsewhere.[17,18] The sample contained NP AIs aged 15 to 57, living on or within 20 miles of their reservation, who were selected by random sampling from tribal rolls using strata defined by age and gender. Tribal members who were located and agreed to participate were interviewed by local AIs after completing extensive training in computer-assisted data collection processes. Informed written consent was obtained from adult participants or from parents/guardians of minors. The original AI-SUPERPFP study received research approval from the Colorado Multiple Institutional Review Board (COMIRB) and participating tribal governments. The secondary analyses presented here were considered not human subjects research by COMIRB and received approval through the local Tribal Institutional Review Board or by Tribal Resolution.

Outcome Variables

Count of Past Year Chronic Health Problems—We used a count of 15 self-reported past year chronic physical health problems (PYCPHP) diagnosed by a doctor and reported by the participant as the outcome. The value of PYCPHP was an enumeration of the following physical health problems: tuberculosis, arthritis, diabetes, high blood pressure, heart disease, kidney problems, stroke, high cholesterol, liver problems, thyroid problems, anemia, gall bladder disease, gynecological problems (women)/prostate problems (men), bladder or urinary problems, and cancer. We identified chronic health conditions using the Chronic Conditions Classification.[19] In our count we included anemia and tuberculosis due to the prolonged and continuously high rates experienced by the AI population.[20–23]

Past Year Chronic Physical Health Problems—Each of the participant's 15 chronic health problems (present/absent) noted above was also used as a dependent variable. We assessed the relationship of the study participant's boarding school attendance to each condition.

Primary Independent Variable

Boarding School Variable—Our primary independent variable asked if the participant, "Did you ever attended boarding school (yes/no)?"

Control Variables

Parental Boarding School Attendance—We controlled for parental boarding school attendance. Questions asked, "Did your father attend boarding school? (yes/no)" and "Did your mother attend boarding school (yes/no)?"

Other Control Variables—Age was dichotomized, 21 or younger and 22 or older. Age serves a necessary control variable to account for policy shifts that transferred the operation and management of boarding schools to AI people. Individuals 21 and younger who

attended boarding school did so after tribes in the NPs began to manage boarding schools, creating an education experience that was more likely to support, encourage, and include cultural connections in the educational environment. Other control variables included sex, marital status, the completion of a high school education or the equivalent, income below the federal poverty level, the number of past year diagnosed DSM-IV mental disorders, and health related quality of life (HRQOL). HRQOL was measured by the SF-36 and includes eight domains.[24,25] Physical functioning assessed the ability to perform physical activities; role-physical measured problems with daily activities; bodily pain assessed the extent of bodily pain; general health evaluated personal health beliefs; vitality assessed energy; social functioning measured the extent that physical or emotional problems interfered with normal social activities; role emotional assessed problems with daily activities resulting from emotional problems; mental health assessed feelings of nervousness and depression; reported health transition asked participants to compare their current health to health from a year ago.[24,25] The mean of these eight items form a score ranging from 0 to 100 with higher scores indicating higher levels of functioning and ability.[25–27]

Analysis

To understand our sample, we calculated descriptive statistics --counts, percentages, means, and standard deviations --for all variables. The PYCPHP variable exhibited over-dispersion, variance greater than the mean. To account for this we used negative binomial regressions.[28] Using bivariate negative binomial regressions we assessed the relationship of the PYCPHP diagnosed by a doctor and the participant's boarding school attendance. We also assessed the bivariate relationship of PYCPHP and each control variable separately- father's attendance, mother's attendance, age, sex, marital status, high school education or equivalent, unemployment, income below federal poverty level, number of past year DSM IV diagnosed mental disorders, and HRQL. We describe unadjusted and adjusted models that report the rate ratios, 95% confidence intervals, and p-values. Lastly, using logistic regression models, we examined each of the 15 health conditions as a dependent variable (condition present/absent) and the participant's boarding school attendance, adjusting for the same control variables noted above. Unadjusted and adjusted models report the odds ratios, 95% confidence intervals, and p-values

We employed *M*plus[29] for all analyses, utilizing full-information maximum likelihood to compute all statistics which allowed us to account for missing data (less than 5%), and thereby retain our full sample. For all analyses we used weights to account for the differential probability of selection across the strata and to adjust for nonresponse.[30]

Results

The count of the PYCPHP had a mean of 1.6 (sd=2.3) (results not shown in tables). Table 1 describes the 1,638 NP AIs who formed our analysis sample. About half attended boarding school (47%), approximately one-third had a father who attended boarding school (30%), and almost half had a mother that attended (48%). Nearly half of the participants (52%) were female; about half (51%) were married or living as married; and approximately one-third were employed. The average number of DSM-IV diagnosed mental disorders was .34

(sd=.72); the average HRQL score was 82 (sd=16). All variables except having a high school education/GED and an income below the federal poverty level were significantly associated with PYCPHP ($p<.05$).

Table 2 displays the results of the adjusted negative binomial regression model with the count of the PYCPHP as the outcome variable and participant boarding school attendance as the primary independent variable, adjusting for fathers attendance, mother's attendance, age, sex, married/cohabitating, high school education/GED, unemployed, income below the federal poverty level, the number of diagnosed DSM-IV mental disorders, and health related quality of life. AIs who attended boarding school had on average a 44% greater PYCPHP count compared to non-attenders. Participants whose fathers attended boarding school had on average a 36% greater PYCPHP count than those whose father's did not attend boarding school. We did not find a relationship between PYCPHP and mother's boarding school attendance.

Table 3 shows unadjusted and adjusted associations of boarding school attendance with seven of the 15 chronic physical health problems. While we examined all 15 health conditions, we focus only those with adjusted p-values of ≤ .05. NP boarding school attendees were more than twice as likely to have had tuberculosis in the past year. Attendees were also more likely to arthritis (60%), diabetes (81%), high cholesterol (95%), anemia (61%), and gall bladder disease (60%) than non-attendees. The NP AIs who attended boarding school exhibited more than three times greater odds of having cancer in the past year than AI non-attendees.

Discussion

We systematically investigated the relationship between individual boarding school attendance and total number of chronic health conditions, as well as specific health conditions. Our results revealed that both individual and paternal boarding school attendance are associated with chronic health problems. Though we controlled for maternal and paternal boarding school attendance, only father's attendance was related to an increase number of PYCPHP in adulthood. This suggests that father's boarding school attendance is an independent predictor of his child's adult PYCPHP. Prior work among NP AIs noted that men experienced more physical and sexual abuse in boarding school then women.[31] The increased trauma that men faced during boarding school may have produced increased stress which then may affect the biological systems of the body.[1] These stressors may then introduce epigenetic alterations that are then transferred to their children, also known as epigenetic inheritance.[2,32]

These findings are consistent with the Canadian Aboriginal literature that highlights the intergenerational impacts of stress and trauma and their relationship to boarding school attendance.[14,33] Studies among non-AI populations, suggest males may be more sensitive to early life stressors compare to females.[34] Closer attention to the intergenerational impacts of trauma among NP AI communities is needed in order to understand the different social, cultural, and biological pathways through which such inheritance may occurs. Given the

Canadian Aboriginal boarding school results and those evident in the present study, epigenetic investigations among AI boarding school attendees may prove insightful.

Several of the health conditions we assessed were individually predicted by participant boarding school attendance (controlling for parental attendance). The high rates of anemia, high cholesterol, and diabetes could be attributed in part to diets of poor nutritional value and high in starch and sugar which were characteristic of AI boarding schools.[8] Poor nutritional habits could have been carried forward from childhood into adulthood and further reinforced by the Food Distribution Programs on Indian Reservations (FDPIR) which have a significantly lower healthy eating index than other federal food assistance programs.[35] Additionally, stressors such as separation from family, forced use of the English language, forced church attendance, and prohibiting culture practices also negatively impact physical health.[36] Prior studies among NP AI samples demonstrated that a higher stress burden is associated with health conditions such as diabetes and higher allostatic load.[37,38]

The next steps in this line of work are to examine biomarkers of stress among boarding school attendees and non-attendees and their parents. To further clarify the associations we found, examining underlying pathophysiology --specifically, abnormal A1c, cholesterol, heart rate variability-- are logical lines of inquiry. Our study does not specifically address the relationship between gender differences and boarding school attendance. Since males may be more sensitive to early life stressors[34] studies of generational gender differences across males and females may further clarify the relationships found here. In addition, AIs have experienced multiple historical traumas that appear to contribute to their current health status and functioning.[3] Given the collective nature of these experiences, more population-based interventions that promote healing from trauma, intergenerational trauma, and historical trauma may be in order. Since compulsory boarding school policies impacted entire families and multiple generations, targeting the family and community with culturally rooted interventions are warranted.[39,40]

Although our analyses contribute to the literature in substantial ways, this work has weaknesses. Limited to NP AIs, we are unable to generalize to other regions or tribes. Although we suspect tribes across the nation may have similar experiences, further investigation is needed to determine the possible existence of regional variations. Additionally, the data are cross-sectional, and thus preclude causal inferences among the variables of interest. The data used in theses analyses are several years old, but are one of the few available datasets to study the relationship of AI boarding school attendance and health. We expect the relationships found in these analyses to have persisted over time, a supposition supported by the complementarity of our results to findings that drew upon more recent data among Canadian Aboriginal people.[14,33] Although health-related quality of life, which takes into account many aspects of health, was carefully assessed, we lacked adequate information about nutrition to control for the possible contribution of diet. Diet and nutrition impact health. Given the Food Distribution Program on Indian Reservations and its low score on the healthy eating index, future investigations should attempt to account for diet.

Conclusion

Prior studies focus on AI boarding school attendance and its contribution to psychological as well as poor physical health status. The results reported here contribute to this literature by demonstrating that AI boarding school attendance is related to the number of chronic physical health conditions and specific health conditions themselves. We also found that father's boarding school attendance was independently associated with study participant's chronic physical health experienced as an adult. These results highlight the need to consider the role that AI boarding school attendance and father's attendance has on current health and disparities. They also underscore the importance of empirical work for advancing the broader discourse about the potential contribution of traumatic experiences of this nature to the health and well-being of AI people. The findings of this study suggest subtle variations in risk that argue for the role of scientific data to further inform such conversation.

Acknowledgments

Research reported in this publication was supported by the National Institute on Minority Health and Health Disparities under Award Number 2 U54 MD000507-15 (SM Manson, PI).

References

1. Sotero M. A conceptual model of historical trauma: Implications for public health practice and research. 2006
2. Yehuda R, Daskalakis NP, Bierer LM, et al. Holocaust Exposure Induced Intergenerational Effects on FKBP5 Methylation. Biological psychiatry. 2016; 80(5):372–380. [PubMed: 26410355]
3. Warne D, Lajimodiere D. American Indian health disparities: psychosocial influences. Social and Personality Psychology Compass. 2015; 9(10):567–579.
4. Acts of Fifty-First Congress —Second Session. Acts of Fifty-First Congress —Second Session; Proviso. Compulsory attendance US1891. 386
5. Child BJ. Boarding School Seasons: American Indian Families, 1900–1940. Lincoln and London: University of Nebraska Press; 1998.
6. Yellow Horse Brave Heart M, DeBruyn LM. The American Indian Holocaust: healing historical unresolved grief. Am Indian Alsk Native Ment Health Res. 1998; 8(2):56–78. [PubMed: 9842066]
7. Trennert RA. Corporal punishment and the politics of Indian reform. History of Education Quarterly. 1989; 29(4):595–617.
8. Meriam L. The Problem of Indian Administration. Baltimore, Maryland: Institute for Government Research, Studies in Administration; 1928.
9. Charbonneau-Dahlen BK, Lowe J, Morris SL. Giving voice to historical trauma through storytelling: The impact of boarding school experience on American Indians. Journal of Aggression, Maltreatment & Trauma. 2016; 25(6):598–617.
10. The Indian Self-Determination and Education Act, 25 USC 450 25 USC 450(1975).
11. Kaspar V. The lifetime effect of residential school attendance on indigenous health status. Am J Public Health. 2014; 104(11):2184–2190. [PubMed: 24328622]
12. Barton SS, Thommasen HV, Tallio B, Zhang W, Michalos AC. Health and quality of life of Aboriginal residential school survivors, Bella Coola Valley, 2001. Social Indicators Research. 2005; 73(2):295–312.
13. Running Bear U, Beals J, Kaufman CE, Manson SM. Boarding School Attendance and Physical Health Status of Northern Plains Tribes. Applied Research in Quality of Life. 2017
14. Bombay A, Matheson K, Anisman H. The intergenerational effects of Indian Residential Schools: Implications for the concept of historical trauma. Transcultural Psychiatry. 2014; 51(3):320–338. [PubMed: 24065606]

15. Elias B, Mignone J, Hall M, Hong SP, Hart L, Sareen J. Trauma and suicide behaviour histories among a Canadian indigenous population: An empirical exploration of the potential role of Canada's residential school system. Social Science & Medicine. 2012; 74(10):1560–1569. [PubMed: 22464223]
16. Beals J, Manson SM, Mitchell CM, Spicer P. Cultural specificity and comparison in psychiatric epidemiology: walking the tightrope in American Indian research. Cult Med Psychiatry. 2003; 27(3):259–289. [PubMed: 14510095]
17. Beals J, Manson SM, Croy C, et al. Lifetime prevalence of posttraumatic stress disorder in two American Indian reservation populations. Journal of Traumatic Stress. 2013; 26:512–250. [PubMed: 23900893]
18. Beals J, Manson SM, Mitchell CM, Spicer P. AI-SUPERPFP-Team. Cultural specificity and comparison in psychiatric epidemiology: walking the tightrope in American Indian research. Culture, Medicine and Psychiatry. 2003; 27:259–289.
19. Gerteis J, Izrael D, Deitz D. , et al. Multiple Chronic Conditions Chartbook. Quality AfHRa. , editorRockville, MD: Agency for Healthcare Research and Quality; 2014.
20. Rieder HL. Tuberculosis among American Indians of the contiguous United States. Public Health Reports. 1989; 104(6):653–657. [PubMed: 2511601]
21. Reilley B, Bloss E, Byrd KK, Iralu J, Neel L, Cheek J. Death Rates From Human Immunodeficiency Virus and Tuberculosis Among American Indians/Alaska Natives in the United States, 1990–2009. Am J Public Health. 2014; 104(Suppl 3):S453–S459. [PubMed: 24754664]
22. Khambalia AZ, Aimone AM, Zlotkin SH. Burden of anemia among indigenous populations. Nutrition Reviews. 2011; 69(12):693–719. [PubMed: 22133195]
23. Hampton JE. Penicious anemia in American Indians. Journal - Oklahoma State Medical Association. 1960; 53:503–509. [PubMed: 13711129]
24. Ware JE, Jr. SF-36 Health Survey: Manual and interpretation guide. Boston, MA: The Health Institute, New England Medical Center; 1993.
25. Ware JE, Jr. SF-36 physical and mental health summary scales: A user's manual. Boston, MA: The Health Institute; 1994.
26. Gandek B, Ware JE Jr, Aaronson NK, et al. Tests of data quality, scaling assumptions, and reliability of the SF-36 in eleven countries: Results from the IQOLA Project. Journal of Clinical Epidemiology. 1998; 51(11):1149–1158. [PubMed: 9817132]
27. Ware JE Jr, Kosinski M. Interpreting SF-36 summary health measures: A response. Quality of Life Research. 2001; 10:405–413. [PubMed: 11763203]
28. Atkins DC, Gallop RJ. Rethinking how family researchers model infrequent outcomes: a tutorial on count regression and zero-inflated models. Journal of family psychology : JFP : journal of the Division of Family Psychology of the American Psychological Association (Division 43). 2007; 21(4):726–735.
29. Muthen LK, Muthen BO. Mplus Users Guide. Version 7. Los Angeles, CA: Muthen & Muthen; 2015.
30. Kish L. Survey Sampling. New York: John Wiley & Sons; 1965.
31. Yellow Horse Brave Heart M. Gender differences in the historical trauma response among the Lakota. Journal of health & social policy. 1999; 10(4):1–21. [PubMed: 10538183]
32. Thayer ZM, Kuzawa CW. Biological memories of past environments: epigenetic pathways to health disparities. Epigenetics. 2011; 6(7):798–803. [PubMed: 21597338]
33. Bombay A, Matheson K, Anisman H. The impact of stressors on second generation Indian residential school survivors. Transcultural Psychiatry. 2011; 48(4):367–391. [PubMed: 21911507]
34. Stinson S. Sex differences in environmental sensitivity during growth and development. American Journal of Physical Anthropology. 1985; 28(S6):123–147.
35. Shanks CB, Smith T, Ahmed S, Hunts H. Assessing Foods Offered in the Food Distribution Program on Indian Reservations (FDPIR) Using Healthy Eating Index-2010. Public health nutrition. 2016; 19(7):1315–1326. [PubMed: 26298513]
36. Running Bear U, Croy CD, Kaufman CE, Thayer ZM, Manson SM. The relationship of five boarding school experiences and physical health status among Northern Plains Tribes. Quality of

life research : an international journal of quality of life aspects of treatment, care and rehabilitation. 2017

37. Jiang L, Beals J, Whitesell NR, Roubideaux Y, Manson SM. Stress Burden and Diabetes in Two American Indian Reservation Communities. Diabetes Care. 2008; 31(3):427–429. [PubMed: 18070997]
38. Thayer Z, Barbosa-Leiker C, McDonell M, Nelson L, Buchwald D, Manson S. Early life trauma, post-traumatic stress disorder, and allostatic load in a sample of American Indian adults. American journal of human biology : the official journal of the Human Biology Council. 2017; 29(3)
39. Brave Heart MYH, Chase J, Elkins J, Altschul DB. Historical Trauma Among Indigenous Peoples of the Americas: Concepts, Research, and Clinical Considerations. Journal of Psychoactive Drugs. 2011; 43(4):282–290. [PubMed: 22400458]
40. Schultz K, Walters KL, Beltran R, Stroud S, Johnson-Jennings M. "I'm stronger than I thought": Native women reconnecting to body, health, and place. Health & place. 2016; 40:21–28. [PubMed: 27164432]

Table 1

Descriptive Sample Characteristics and Unadjusted Negative Binomial Result for the Number of Physical Health Conditions Diagnosed by a Doctor within the Past Year with Each Variable

	Sample Characteristics		Unadjusted Negative Binomial†		
n = 1,638	***Count or Mean***	***% or sd***	***Rate Ratio***	***95% CI***	***P-value***
Primary Independent Variable					
Ever attended boarding school	770	47%	1.45	1.26, 1.68	<.001
Parental Boarding School Control Variables					
Father attended boarding school	491	30%	1.23	1.06, 1.43	.006
Mother attended boarding school	786	48%	1.08	0.93, 1.25	.304
Other Control Variables					
Age 21 or younger	312	19%	0.39	0.32, 0.49	<.001
Female	852	52%	1.42	1.23, 1.63	<.001
Married/cohabiting	835	51%	1.27	1.09, 1.46	.001
High school graduate or GED	753	46%	0.92	0.80, 1.06	.278
Unemployed	524	33%	1.54	1.34, 1.79	<.001
Income below federal poverty level	1016	62%	1.13	0.97, 1.30	.129
Number of past-year diagnosed DSM-IV mental disorders	0.34‡	0.72	1.30	1.19, 1.40	<.001
Health-Related Quality-Of-Life score	82.2	16	0.96	0.96, .97	<.001

Notes:

†The outcome variable is the number of physical health conditions diagnoses by a doctor experienced within the past year.

‡A mean of 0.34 mental disorders per 1,638 individuals in this sample translates to 20.7 mental disorders per 100,000 people [(.34/1638) *100,000].

Table 2

Adjusted Negative Binomial Results for the Number of Physical Health Conditions with Participant's Boarding School Attendance

n=1,638	***Rate Ratio***	***95% CI***	***P-value***
Primary Independent Variable			
Participant Ever attended boarding school	1.44	1.19, 1.73	<.001
Parental Boarding School Control Variables			
Father attended boarding school	1.36	1.13, 1.64	.001
Mother attended boarding school	1.09	.91, 1.30	.357
Other Control Variables			
Age 21 or younger	.30	.20, .43	<.001
Female	1.79	1.49, 2.16	<.001
Married/Cohabitating	1.10	.91, 1.32	.330
High school graduate or GED	.93	.77, 1.12	.434
Unemployed	1.25	1.03, 1.52	.023
Income below federal poverty level	.98	.81, 1.19	.836
Number of past-year diagnosed DSM-IV mental disorders	.88	.77, 1.01	.053
Health-Related Quality of Life score	.97	.96, .97	<.001

Table 3

Unadjusted and Adjusted Logistic Regression Results for the Association of Chronic Physical Health Conditions with Participant's Boarding School Attendance

	Unadjusted			Adjusted†		
Physical Health Condition	***Odds Ratio***	***95% CI***	***P-value***	***Odds Ratio***	***95% CI***	***P-value***
Tuberculosis	2.44	1.51, 3.94	<.001	2.07	1.27, 3.38	.004
Arthritis	2.14	1.51, 3.05	<.001	1.60	1.09, 2.36	.017
Diabetes	2.34	1.60, 3.41	<.001	1.81	1.21, 2.71	.004
High cholesterol	2.62	1.62, 4.24	<.001	1.95	1.17, 3.28	.011
Anemia	1.89	1.34, 2.68	<.001	1.61	1.10, 2.36	.015
Gall bladder disease	1.90	1.31, 2.76	.001	1.60	1.07, 2.38	.023
Cancer	5.12	2.11, 12.42	<.001	3.87	1.53, 9.78	.004

Notes:

Each row represents a separate logistic regression model. Adjusted† models control for father's boarding school attendance, mother's boarding school attendance, age, sex, married/cohabitating, high school education/GED, unemployed, income below the poverty level, number of DSM-IV mental disorders, and health related quality of life.