Exploring the Evidence Base for the Relationship between Health and Learning

PREFACE

This document describes the results of a literature search undertaken for the purpose of identifying existing, credible, scientific evidence for an array of eleven hypotheses concerning the relationship between health and learning.

Each hypothesis gave rise to a formula question, from which key words and phrases were extracted for an electronic search of PubMed and the Cumulative Index of Nursing and Allied Health Literature (CINAHL). Bibliographies and abstracts were reviewed for relevant citations corresponding to the hypotheses which met the search parameters of: English language, published 1998 or later, and contained intervention or comparison data. Articles that were descriptive in nature (only) or literature reviews were not used as primary citations (unless they also included original data), though several particularly comprehensive or useful articles of this nature are included as “worthy mentions”.

The document is presented in two parts. The first, a table, is intended to portray for the reader the initial hypothesis, the search questions, and the eventual evidence-based statement related to the original hypothesis. The table is also intended to give an overview of the volume of material retrieved in the electronic search, followed by the volume of citations “saved” for review, the volume of citations “reviewed” by the author, and the number of citations listed as relevant to the statement. The second portion of the document contains the bibliographies supporting each evidence-based statement.

The evidence search has several limitations, not the least of which is the limited number of qualifying studies and noncomparable outcomes. Many health studies do not contain measures of academic progress of school children; many academic studies do not contain health measures. Other limitations include issues related to children as research subjects; variations and inconsistencies in use of terms; and finally limitations inadvertently set by the search keywords themselves.

The author wishes to gratefully acknowledge the assistance of Teresa Hartman, MLS of the McGoogan Medical Library of the University of Nebraska Medical Center for her invaluable contributions as a reference librarian to the search. Also noteworthy is the use of RefWorks®, an online research management tool. For more information about RefWorks®, please see www.RefWorks.com.

The interpretations and conclusions expressed in this document are entirely the responsibility of the author, Kathy Karsting, RN, MPH. For more information, please contact the author.
<table>
<thead>
<tr>
<th>No.</th>
<th>Hypothesis</th>
<th>PICO Questions</th>
<th>Index</th>
<th>Key Words</th>
<th>Ret.</th>
<th>Sav.</th>
<th>Rev. (total)</th>
<th>Used (total)</th>
<th>Notes on Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hypothesis #1: School performance improves through the implementation of school health screening and referral services for vision, hearing, and oral health.</td>
<td>PubMed</td>
<td>Educational Status</td>
<td>School Health Performance</td>
<td>124</td>
<td>46</td>
<td>33</td>
<td>10+</td>
<td>Three citations total related to hearing. None vision. One dental 7 to PICO 4 chronic illness – 3 ADHD 4 Asthma 7 to PICO 5 SN case mgmt. 1 to PICO 8 CSHP 1 to PICO 9 Staff H Prom Numerous citations related to obesity/BMI moved to Question 4.</td>
</tr>
<tr>
<td></td>
<td>PICO #1: In children and youth aged 5-17 years, what is the effect of school health screening and referral services for vision, hearing, and oral health on learning performance, compared with groups of children where screening services are not performed?</td>
<td>CINAHL</td>
<td>Health Screening</td>
<td>Academic Performance</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
<td>Citations used include retrievals using PICOs 1, 4, 10, and 11. Revise PICO: Hearing and vision defects and learning. Dental health and absenteeism. Explore relationship between attendance and achievement.</td>
</tr>
<tr>
<td></td>
<td>PICO #2: In children and youth aged 5-17 years, what is the effect of regular and frequent physical activity at school on measures of learning performance or absenteeism, compared with children and adolescents who do not participate in regular or frequent physical activity.</td>
<td>CINAHL</td>
<td>Physical Activity OR Physical Education and Training</td>
<td>Academic Performance Limits: age groups 6-12 and 13-18 yo.</td>
<td>7</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hypothesis #3: Nutrition impacts learning and behavior.</td>
<td>PubMed</td>
<td>Absenteeism</td>
<td>Nutritional Status OR Nutrition Assessment AND Schools or Students</td>
<td>4</td>
<td>3</td>
<td>38</td>
<td>17</td>
<td>A rich and international evidence base dating back to the 1970's, readily available.</td>
</tr>
<tr>
<td></td>
<td>PICO #3: In children and youth aged 5-17 years, what is the effect of improved nutrition on learning performance or absenteeism, compared with children and youth who do not receive improved nutrition.</td>
<td>PubMed</td>
<td>Absenteeism</td>
<td>Child or</td>
<td>16</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypothesis #4:</td>
<td>Chronic illness affects attendance and performance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PICO #4:</td>
<td>Are children and youth who have chronic illness/poor dental health/obesity at higher risk for absenteeism from school compared to children who do not have chronic illness/poor dental health/obesity?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVIDENCE-BASED STATEMENT #4:</td>
<td>Chronic illness affects attendance and performance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Asthma...attendance. Performance effect is related to asthma severity. Management improves with education.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- ADHD...attendance, performance, and persistent problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Chronic pain or illness...attendance, effects on performance when absenteeism is extreme; relationship between chronic pain, depression, and absenteeism</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Obesity...closely related to: socioeconomic status and stress of poverty, low levels of physical activity, associated with poorer attendance and performance (effects are muted in the gen’l population).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypothesis #5:</th>
<th>Chronic illness management by the school nurse reduces absenteeism and improves performance.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICO #5:</td>
<td>Among children with chronic health conditions, what is the effect of school nurse case management on absenteeism or performance compared to children with chronic health conditions who receive no case management services from school nurses?</td>
</tr>
<tr>
<td>EVIDENCE-BASED STATEMENT #5:</td>
<td>Chronic illness management by the school nurse reduces absenteeism.</td>
</tr>
<tr>
<td>- Improvements in parent knowledge and management.</td>
<td></td>
</tr>
<tr>
<td>- Improvements in student knowledge and management.</td>
<td></td>
</tr>
<tr>
<td>- Greater likelihood of asthma meds at school.</td>
<td></td>
</tr>
<tr>
<td>- Strong evidence relates to asthma; some general studies of chronic illness.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hypothesis #6:</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>Performance is affected by indoor air quality.</td>
</tr>
<tr>
<td></td>
<td><strong>EVIDENCE-BASED STATEMENT #6:</strong></td>
</tr>
<tr>
<td></td>
<td>• Air contaminants (carbon monoxide, toluene, volatile organic compounds) affect memory, performance of complex tasks, and response time.</td>
</tr>
<tr>
<td></td>
<td>• Persistent severe air pollution produces cognitive dysfunction.</td>
</tr>
<tr>
<td></td>
<td>• Effects may be mediated by stress and cognition.</td>
</tr>
<tr>
<td></td>
<td>Poor air quality has profound effects on brain function.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Hypothesis #7:</th>
<th>PICO #7:</th>
<th>PubMed</th>
<th>Learning or Cognition</th>
<th>Sleep Limits: Child and Adolescent, English</th>
<th>904</th>
<th>64</th>
<th>21</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cognitive performance is affected by sleep.</td>
<td>In children and youth, what is the effect of sleep on learning performance compared with children and youth who do not receive adequate sleep?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>EVIDENCE-BASED STATEMENT #7:</strong></td>
<td>Performance and learning are profoundly affected by sleep. Chronic sleep deprivation is linked with higher risk of obesity.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Performance and learning are profoundly affected by sleep.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Hypothesis #8:</th>
<th>PICO #8:</th>
<th>PubMed</th>
<th>Coordinated School Health Program</th>
<th>21</th>
<th>14</th>
<th>4+</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coordinated school health programs (CSHP) show promising effects in improving student outcomes.</td>
<td>In schools, what is the effect of CSHP on absenteeism or measures of performance, compared to schools without CSHP?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>EVIDENCE-BASED STATEMENT #8:</strong></td>
<td>Coordinated School Health Programs are considered promising because of evidence for effects in some domains, but the evidence for all components operating together to produce gains in student learning is weak.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coordinated School Health Programs are considered promising because of evidence for effects in some domains, but the evidence for all components operating together to produce gains in student learning is weak.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Hypothesis #9:</th>
<th>PICO #9:</th>
<th>PubMed</th>
<th>Occupational Health Services Health Promotion Schools</th>
<th>Schools Workplace</th>
<th>31</th>
<th>78</th>
<th>10</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Staff health promotion impacts student outcomes.</td>
<td>Schools with staff health promotion activities have improved measures of student performance, compared with schools without health promotion activities for staff.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>EVIDENCE-BASED STATEMENT #9:</strong></td>
<td>There were no retrieved studies measuring academic outcomes for students where staff health promotion activities were implemented. The single citation noted provides a review of staff health promotion from the national School Health Policies and Practices study of 2006.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**EVIDENCE-BASED STATEMENT #9:**
There is no evidence that staff health promotion produces positive impacts for student learning.

<table>
<thead>
<tr>
<th></th>
<th>CINAHL</th>
<th>Schools Health Promotion Staff (text word)</th>
<th>Occupational Health Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Hypothesis #10: Education is strongly related to health in populations. High school completion is a public health issue. <strong>PICO #10:</strong> In populations of children and youth with chronic health care needs, what is the effect of high school graduation on future health status compared with children with children who do not have special health care needs? Does high school graduation influence mortality or morbidity in children and youth with special health care needs? Does health status in childhood influence high school graduation in children and youth with special health care needs?  <strong>EVIDENCE-BASED STATEMENT #10:</strong> Health and Education outcomes in populations are closely linked. - Children with some chronic illnesses and mental illness experience lower educational attainment. (Match outcomes of peers: sarcoidosis, cancer. Do not match peers: ADHD, speech and language, mental disorders). - Individuals who do not graduate from high school suffer more chronic health issues, disability, and health risks than those who do graduate. - Health and educational outcomes are mediated by complex social, economic, interpersonal, and psychological factors.</td>
<td>PubMed</td>
<td>Chronic Disease</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>CINAHL</th>
<th>Chronic Disease</th>
<th>Educational Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Hypothesis #11: Health status in childhood is predictive of adult health burden in populations. <strong>PICO #11:</strong> Does health status in childhood predict health status in adulthood?  <strong>EVIDENCE-BASED STATEMENT #11</strong> Conditions of childhood, including some health conditions, are significantly related to poor health outcomes in adult populations. - Conditions impacting the life course:  - Abuse and neglect in childhood, high stress  - Mental Illness in Adolescence  - ADHD  - Educational attainment  - Mediated by: poverty, cognition  - Most functional difficulties in children with special health</td>
<td>PubMed</td>
<td>Health Status Also text words childhood health status adulthood</td>
</tr>
</tbody>
</table>

Additional data sources provided in “worthy mention” section.
care needs are respiratory or mental health in nature.

- Asthma in the general population: higher among children under age 15 than among persons aged 15 – 34 years and 35 and over.
- Risk of diabetes increases steadily with age.
Exploring the Evidence Base for the Relationship between Health and Learning

**BIBLIOGRAPHIES**

**Parameters of the literature search:**
- Recent publication date (1998 or later)
- English only
- Comparison or intervention data
- Excluded if descriptive only in nature

**Worthy Mention:**
- Useful source information
- Comprehensive review
- Literature search without new results
- Compelling info dated prior to 1998
- Prevalence or trend data without comparison or intervention.

**STATEMENT #1: Evidence supports mental health screening of adolescents.**
- Mental disorders are strongly associated with school drop out.
- (Quality) Intervention is effective.
- Mental health in adulthood relates to mental health in adolescence.

**BIBLIOGRAPHY #1:**


**Worthy Mention:**

kathy.karsting@nebraska.gov

STATEMENT #2. Physical activity stimulates learning.
• Physical fitness is significantly related to school achievement.
• Vigorous physical activity boosts performance.
• No negative impact of physical education.

BIBLIOGRAPHY #2:


STATEMENT #3. Nutrition affects learning and behavior.
• Breakfast improves attention, memory, test performance, attendance, weight control.
• Food insufficiency relates to poor behavioral and academic function in low income children.
• Food quality and frequency may relate to positive effects.

BIBLIOGRAPHY #3:


kathy.karsting@nebraska.gov

4/13/2009 rev. 5/21/2010

STATEMENT #4. Chronic illness affects attendance and performance.
• Asthma…attendance. Performance effect is related to asthma severity. Management improves with education.
• ADHD…attendance, performance, and persistent problems
• Chronic pain or illness…attendance, effects on performance when absenteeism is extreme; relationship between chronic pain, depression, and absenteeism
• Obesity… closely related to: socioeconomic status and stress of poverty, low levels of physical activity, associated with poorer performance and attendance (effects are muted in the gen’l population).

BIBLIOGRAPHY #4:

Asthma

ADHD

Worthy Mention:

kathy.karsting@nebraska.gov


Chronic Pain or Illness

Worthy Mention:

Obesity

Worthy Mention:

STATEMENT #5. Chronic illness management by the school nurse reduces absenteeism.

- Improvements in parent knowledge and management.
- Improvements in student knowledge and management.
- Greater likelihood of asthma meds at school.
- Strong evidence relates to asthma, some general studies of chronic illness.

BIBLIOGRAPHY #5:


Worthy Mention:


STATEMENT #6. Poor air quality has profound effects on brain function.

- Air contaminants (carbon monoxide, toluene, volatile organic compounds) affect memory, performance of complex tasks, and response time.
- Persistent severe air pollution produces cognitive dysfunction.
- Effects may be mediated by stress and cognition.

BIBLIOGRAPHY #6:


Worthy Mention:

STATEMENT #7. Performance and learning are profoundly affected by sleep.
• Chronic sleep deprivation is linked with higher risk of obesity.

BIBLIOGRAPHY #7:


Worthy Mention:
STATEMENT #8: Coordinated School Health Programs are considered promising because of evidence for effects in some domains, but the evidence for all components operating together to produce gains in student learning is weak.

BIBLIOGRAPHY #8:


Worthy Mention:

STATEMENT #9: There is no evidence that staff health promotion produces positive impacts for student learning.

BIBLIOGRAPHY #9:


STATEMENT #10: Health and Education outcomes in populations are closely linked.
- Children with some chronic illnesses and mental illness experience lower educational attainment.
- Individuals who do not graduate from high school suffer more chronic health issues, disability, and health risks than those who do graduate.
- Health and educational outcomes are mediated by complex social, economic, interpersonal, and psychological factors.

BIBLIOGRAPHY #10:


STATEMENT #11: Conditions of childhood, including some health conditions, are significantly related to poor health outcomes in adult populations.

- **Conditions impacting the life course:**
  - Abuse and neglect in childhood, high stress
  - Mental Illness in Adolescence
  - ADHD
  - Educational attainment
  - Mediated by: poverty, cognition

- **Most functional difficulties in children with special health care needs are respiratory or mental health in nature.**

- **Asthma in the general population:** higher in the among children age 15 than among persons aged 15 – 34 years and 35 and over.

- **Risk of diabetes increases steadily with age.**
BIBLIOGRAPHY #11:


Worthy Mention:


RECOMMENDED RESOURCES

LIFECOURSE HEALTH DEVELOPMENT


YOUTH SUICIDE PREVENTION

American Association of Suicidology http://www.suicidology.org/web/guest/certification-programs/school-professionals

American Foundation for Suicide Prevention http://www.afsp.org/

Center for Health and Learning, University of Vermont www.healthandlearning.org

Griefnet www.griefnet.org

Hopeline http://www.hopeline.com

QPR Institute www.qprinstitute.com

Signs of Suicide Program www.MentalHealthScreening.org

Society for the Prevention of Teen Suicide http://www.sptsnj.org

kathy.karsting@nebraska.gov  4/13/2009 rev. 5/21/2010
Suicide Prevention Resource Center Information for School Health and Mental Health Providers:  

TeenScreen National Center for Mental Health Checkups at Columbia University:  
http://www.teenscreen.org/teenscreen-schools-communities