Hygiene and mental health among middle school students in India and 11 other countries

Shamika Ranasinghe, Swathi Ramesh, Kathryn H. Jacobsen

Department of Global & Community Health, George Mason University, Fairfax, VA, USA

Received 26 August 2015; received in revised form 26 October 2015; accepted 1 November 2015

Abstract The Global School-based Student Health Survey (GSHS) collects data from early adolescents who are approximately 13–15 years old and enrolled in middle schools (also known as junior secondary schools). We used logistic regression models to examine the associations between self-reported hygiene practices and mental health status as assessed by the 2007 India GSHS. Then, we used meta-analysis to compare the results from India with those from 11 other GSHS-participating countries in Asia and Africa (Djibouti, Indonesia, Jordan, Kenya, Lebanon, Myanmar, the Philippines, Tanzania, Thailand, Uganda, and the United Arab Emirates). Among 7904 middle school students in India, 25.5% reported symptoms of depression, 8.6% reported loneliness, and 7.8% reported anxiety-related insomnia. Both males and females who reported symptoms of depression had an increased likelihood of poor hand and oral hygiene, including washing their hands rarely or never and brushing their teeth less than daily. The meta-analysis for this association yielded statistically significant pooled odds ratios for both boys and girls. In girls, loneliness was also associated with poor hand and oral hygiene. Reduced mental health status in adolescents may lead to worse hygiene behaviors and an increased risk of infections. Teachers, parents, healthcare workers, and other adults who observe suboptimal hygiene status in an adolescent should consider whether this indicates a mental health issue that requires clinical services.

© 2015 King Saud Bin Abdulaziz University for Health Sciences. Published by Elsevier Limited. All rights reserved.
Introduction

Clean hands, faces, bodies, and teeth can significantly improve health status and reduce the risk of infection [1]. Hand-washing is an effective primary prevention method for reducing the incidence of diarrhea and respiratory infections, including influenza [1,2]. An estimated one million annual infectious disease deaths worldwide could be averted by improved hand hygiene practices [3]. Personal body and facial hygiene also reduce the risk of skin infections and trachoma, a bacterial infection that can cause incurable blindness [1]. Dental hygiene reduces the risk of dental caries and periodontal disease, which are associated with oral and cardiovascular health as well as overall well-being [4,5]. Oral hygiene may also reduce the risk of respiratory tract infections [6]. Hygiene behaviors may also be linked to mental health status, as previous studies have found that psychological distress, low self-esteem, and unhappiness are associated with poor personal hygiene [7–10].

The World Health Organization defines health as "a state of complete physical, mental, and social wellbeing, and not merely the absence of disease or infirmity" [11], and any condition that impairs physical, mental, or social health reduces both individual well-being and the well-being of communities. Previous studies have highlighted the connections between hygiene and physical health and between hygiene and social health. The link between hygiene and psychological health has been less frequently studied. The aim of this analysis was to examine the associations between mental health and hygiene behaviors among middle school (sometimes called junior secondary or intermediate school) students who participated in the Global School-based Student Health Survey (GSHS). Reduced mental health status in adolescents may lead to unfavorable hygiene behaviors and an increased risk of infections.

Methods

The GSHS is conducted by low- and middle-income countries (LMICs) in collaboration with the U.S. Centers for Disease Control and Prevention (CDC) and World Health Organization. All of the countries that participate in the GSHS follow a standard protocol for ethics approval, sampling, surveying, and data management, and all of these countries select survey items from the same validated questionnaire bank. A two-stage cluster sampling design is used. In the first stage of the 2007 India GSHS, 75 Central Board of Secondary Education (CBSE) schools with students in grades that typically include 13- to 15-year-olds—those in classes (grades) 8, 9, and 10—were randomly sampled from across the country. The CBSE is an examining board that oversees student assessment at most public (government-run) and private secondary schools. In the second stage, classrooms from classes 8, 9, and 10 that were within the sampled schools were randomly sampled, and all students in these classrooms were invited to volunteer to complete an anonymous self-report survey during school hours. In total, 74 of the 75 sampled schools participated (99%), and 8130 (85%) of the students from the sampled classrooms responded to the survey. To ensure the confidentiality of shared information and the privacy of the participants, no information about the participating schools (such as the state in which the school is located, whether it is in a rural or urban setting, the total number of enrolled students, or whether the school is public or private) was included in the public dataset.

This analysis focuses on the association between hygiene and mental health. The questions "During the past 30 days, how often did you wash your hands after using the toilet or latrine?" and "During the past 30 days, how many times per day did you usually clean or brush your teeth?" were used to assess hygiene behaviors. The hand washing question had a 5-point frequency response scale. Students who reported washing their hands ‘rarely’ or ‘never’ (rather than ‘sometimes’, ‘most of the time’, or ‘all of the time’) after using the toilet were considered to be engaging in high-risk hygiene behaviors due to not engaging in adequate hand washing practices. The tooth brushing question had possible responses of ‘I did not clean or brush my teeth during the past 30 days’, ‘less than 1 time per day’, ‘1 time per day’, ‘2 times per day’, ‘3 times per day’, and ‘4 or more times per day’. Students who reported brushing their teeth less than 1 time daily during the past month—those never brushing or cleaning their teeth during the past month and those who reported brushing less frequently than daily—were categorized as having high-risk hygiene behavior due to poor oral hygiene.

Three questions about the symptoms of depression, anxiety, and loneliness were indicators of mental health status. ‘During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing your usual activities?’ was an indicator of symptoms of depression and had possible responses of ‘yes’ and ‘no’. ‘During the past 12 months, how often have you been so worried about something that you could not sleep at night?’ was an indicator of anxiety, and ‘During the past 12 months,
how often have you felt lonely?’ was an indicator of loneliness. Responses to these two questions were on a 5-point frequency scale that was recoded into dichotomous variables. ‘Most of the time’ and ‘always’ were considered to be markers of a higher-risk mental health status (a greater likelihood of a mental health disorder). ‘Sometimes’, ‘rarely’, and ‘never’ were considered to be markers of a lower-risk mental health status (a lower likelihood of having a mental health disorder).

The 110 participating students from India who did not provide their age or sex and the 116 participating students from India who did not report that they were in class 8, 9, or 10 were excluded from this analysis; the final participant count was 7904. The weighting variable provided with the GSHS data set was used to adjust for minor differences between the demographics of the study participants and those of the CBSE student population as a whole. All of the counts reported in this paper are unadjusted, but all of the proportions and statistical tests use weighting. Two-sided Pearson’s chi-squared tests were used to test for differences in the responses to key variables by age and sex. Separate sex-specific, age-adjusted multiple logistic regression models were used to examine the associations between each of the hygiene behaviors (considered to be dependent variables in the regression models) and mental health variables (considered to be independent variables in the models). All of these analyses were conducted with SPSS (version 22) and a significance level of \( \alpha = 0.05 \).

To more fully understand the associations between hygiene and mental health in the India GSHS, a meta-analysis was used to compare the results from India with those from eleven other GHS countries in Asia (Indonesia, Jordan, Lebanon, Myanmar, Philippines, Thailand, and United Arab Emirates) and Africa (Djibouti, Kenya, Tanzania, and Uganda). These eleven countries include all of the GSHS-participating countries that included the depression and hand washing variables in their public-use datasets and were located in Asia or were African nations that bordered the Indian Ocean. All GSHS-participating countries use the same sampling methods and questionnaire items. However, because the sample sizes for the surveys are not proportional to the total population of school-aged children (that is, because most countries sample approximately 50–75 schools for participation regardless of whether there are 50 or thousands of middle schools in the country), it is not appropriate to merge the GHS datasets from different countries into a single combined file for analysis. Such a merger would underweight India and other countries that have millions of middle school students (of which fewer than 1% participated in the GSHS) and would overweight small island nations and other countries with only a few thousand students in the eligible age group (of which perhaps nearly 100% would be sampled for participation in the GSHS). Therefore, the meta-analysis software program MedCalc (version 14.8.1) was used to calculate separate pooled odds ratios (pORs) for boys and girls. The datasets from all countries were downloaded, cleaned, and analyzed with the same methods used for the India dataset.

Results

In total, 25.5% of the 7904 students from India reported sadness and hopelessness that were consistent with the symptoms of depression, 8.6% reported persistent loneliness, and 7.8% reported insomnia related to anxiety (Table 1). The prevalence of all three of these markers of mental health significantly increased with age. Boys and girls reported similar rates of depression and anxiety symptoms, but girls reported more loneliness than boys. In total, 3.3% of the students reported rarely or never washing their hands after using the toilet, and 4.4% reported brushing their teeth less than daily. The prevalence of poor hygiene behaviors was similar across age and sex categories.

Students recording responses that were consistent with a poor mental health status were significantly more likely than their classmates to report poor hygiene behaviors (Table 2). Both boys and girls who reported symptoms of depression were approximately twice as likely as other students to report infrequent hand hygiene and tooth brushing. Anxiety was not significantly associated with hand washing or tooth brushing. Girls reporting loneliness were approximately twice as likely as other girls to report infrequent hand and oral hygiene.

In the India GSHS, the association with the greatest magnitude was between symptoms of depression and infrequent hand washing after using the toilet. A meta-analysis of this association in twelve GHS countries (India plus eleven other countries) yielded a random-effects pooled odds ratio (and 95% confidence interval) of 1.63 (1.29, 2.16) for girls and 1.73 (1.40, 2.12) for boys (Fig. 1). These pooled statistics indicate that both male and female students reporting symptoms of depression are more likely than their peers to infrequently wash their hands, and this association is significant in India and many other GHS-participating countries.
Discussion

Most students are attentive to their personal hygiene. For example, a large cross-sectional study in Chennai found that the majority of Indian schoolchildren washed their hands after using the toilet and nearly all of them brushed their teeth at least once per day [12]. An analysis comparing 44 countries that participated in the GSHS found that most students between 13 and 15 years old practice sufficient oral hygiene, but there are differences between the genders [13]. Girls are usually especially good about frequent bathing, washing, and tooth brushing [8–10,13,14]. However, in both the India GSHS and the study in Chennai, there were no differences in personal hygiene between boys and girls, suggesting that gender differences may not be universal and that both boys and girls are at risk of not engaging in adequate personal hygiene behaviors.

Poor mental health was associated with unhygienic behavior in middle school students from India and other LMICs in Africa, Asia, and the Middle East. Similar results of associations between mental wellbeing and hygiene behavior have been reported among youths who have participated in the GSHS in other world regions. A study evaluating GSHS data from nine African countries—Botswana, Kenya, Namibia, Senegal, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe—found that positive mental well-being was associated with consistent handwashing after using the toilet and with tooth brushing two or more times per day [10]. A GSHS analysis of four Southeast Asian countries—India, Indonesia, Myanmar, and Thailand—found that middle school students with one or more indicators of psychological distresses were less likely to brush their teeth at least twice daily and less likely to wash their hands after using the toilet [9].

An association between mental health and hygiene behavior has also been reported in studies of youths from higher income countries, such as Kuwait and the United States [7,8]. In Kuwait, students aged 11–13 years old who reported feeling very happy were more likely to brush their teeth at least twice per day than students who did not feel happy [8]. Adolescent schoolchildren in the United States with dental problems reported more feelings of unhappiness and worthlessness than their peers [7]. The combined results suggest that the link between mental health and hygiene among adolescents might be observed worldwide. There is a need for further studies on the association between depression and hygiene across the lifespan from childhood through older adulthood, including longitudinal studies that evaluate the changing strength of this association from the “tween” years through the teenage years. It will also be helpful to examine behavioral exposures, such as substance use, diet, and physical activity, that are known to be associated with mental health status and that, therefore, might mediate the relationship between mental health and personal cleanliness.

Globally, approximately 10–20% of children and adolescents are affected by mental health disorders [15], and many of these are related to the physical, emotional, and social changes associated with growth and development [16]. Mental health disorders in early adolescence often go undiagnosed and untreated, especially in lower-income
### Table 1  Characteristics of the study population.

<table>
<thead>
<tr>
<th>Characteristics of the study population</th>
<th>By age (years)</th>
<th>By sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants</td>
<td>&lt;12</td>
<td>13</td>
</tr>
<tr>
<td>Depression</td>
<td>597</td>
<td>1981</td>
</tr>
<tr>
<td>Loneliness</td>
<td>20.9</td>
<td>20.5</td>
</tr>
<tr>
<td>Anxiety</td>
<td>6.9</td>
<td>6.0</td>
</tr>
<tr>
<td>Hand washing after toileting</td>
<td>5.6</td>
<td>6.8</td>
</tr>
<tr>
<td>Tooth brushing</td>
<td>4.0</td>
<td>3.4</td>
</tr>
<tr>
<td>Number of participants</td>
<td>597</td>
<td>1981</td>
</tr>
<tr>
<td>Depression</td>
<td>20.9</td>
<td>20.5</td>
</tr>
<tr>
<td>Loneliness</td>
<td>6.9</td>
<td>6.0</td>
</tr>
<tr>
<td>Anxiety</td>
<td>5.6</td>
<td>6.8</td>
</tr>
<tr>
<td>Hand washing after toileting</td>
<td>4.0</td>
<td>3.4</td>
</tr>
<tr>
<td>Tooth brushing</td>
<td>5.1</td>
<td>3.9</td>
</tr>
</tbody>
</table>

### Table 2  Odds ratios (ORs) and 95% confidence intervals (CIs) for the association between hygiene behaviors and mental health.

<table>
<thead>
<tr>
<th>Characteristics of the study population</th>
<th>By age (years)</th>
<th>By sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>% with poor hygiene among those who report symptoms of depression</td>
<td>6.5</td>
</tr>
<tr>
<td>Loneliness</td>
<td>% with poor hygiene among those who report symptoms of depression</td>
<td>2.3</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Age-adjusted OR (95% CI)</td>
<td>2.98 (2.00, 4.42)</td>
</tr>
<tr>
<td>Hand washing after toileting</td>
<td>% with poor hygiene among those who report anxiety</td>
<td>4.8</td>
</tr>
<tr>
<td>Tooth brushing</td>
<td>% with poor hygiene among those who report anxiety</td>
<td>3.2</td>
</tr>
<tr>
<td>Loneliness</td>
<td>Age-adjusted OR (95% CI)</td>
<td>1.52 (0.84, 2.74)</td>
</tr>
</tbody>
</table>

Bolded cells are statistically significant (p < 0.05).
countries where many barriers to seeking mental health care exist, including limited access to psychological and psychiatric services, stigma associated with being diagnosed with and seeking care for a mental health issue, and limited awareness of the options for effective mental health treatment across the lifespan [17,18]. The risk of mental health problems among school-aged children may be related to factors like the stress of poor academic performance, anxiety and fear associated with being involved in bullying as an aggressor and/or as a victim, and perceptions that some schools are not providing a healthy learning environment [19]. Mental health issues that are related to depression, anxiety, or other conditions may lead to behavioral problems at home and school; increased participation in risk-taking behaviors, such as alcohol and drug use; strained relationships with family and peers; and underachievement in school [15,19].

Mental disorders often first develop during adolescence [20]. Common mental health issues, such as depressive and anxiety disorders [21], may solely occur during adolescence or may continue into adulthood [22]. Depression, which is characterized by persistent sad moods, loss of energy, and a lack of interest in usual activities, can alter adolescent behavior and result in suicidal ideation [23]. Anxiety disorders among children include generalized anxiety disorder, social anxiety disorder, panic disorder, and obsessive-compulsive disorder [24]. Other prevalent mental health conditions include eating disorders, conduct disorders, and substance use disorders [20,21]. Mental health disorders can often be managed with treatment, and early detection of these conditions is critical for helping adolescents gain access to appropriate therapies that can reduce the symptoms and mitigate the likelihood that the disorder will persist into adulthood [22].

Treatment options, including counseling, cognitive behavioral therapy, and psychotropic drugs, can be effective for a variety of mental health disorders, although the effectiveness of medications in adolescents requires further testing [19,25]. Adolescents in high-income countries may have outpatient care, such as individual therapy and group or family therapy, available or they may be admitted for partial hospitalization or full-time residential treatment [25]. In contrast, access to these types of mental health services is often limited in low- and middle-income countries [19].

The GSHS has many strengths, including the use of standardized methods that allow for comparisons across countries, but it also has several limitations. The GSHS uses self-reported data and does not validate student responses with direct observation. Because only school-going children and adolescents participate in the survey, the results may not apply to same-age peers who are not enrolled in school, some of whom may be absent from school due to mental illness. Because the GSHS does not ask about the socioeconomic status of the participants’ households, no information about family income, parental education and employment, access to affordable medical care, or other potentially relevant information is available. The cross-sectional study design does not allow for examination of causality, and it does not allow for changes in hygiene or health status to be tracked over time. Even so, this study of thousands of Indian middle school students and a large comparison group from other countries suggests that there is a meaningful relationship between poor hygiene and poor mental health among early adolescents.

Teachers, parents, healthcare workers, and other adults who observe a suboptimal hygiene status in an adolescent should consider whether this might indicate a new or ongoing mental health issue that requires clinical services. This may be especially important when the adult has observed a recent change in the hygiene status that might indicate a new mental distress related to school performance issues, difficult relationships with parents or peers (related to bullying, dating, or other social interactions), concerns about family security or the future, physical illnesses or injuries, substance abuse, or other possible triggers of reduced mental health. Providing adolescents with mental health services may in turn improve hygiene, reducing the risk of acquiring an infection.

Acknowledgement

Ms. Ranasinghe was supported by a graduate research fellowship from the College of Health & Human Services of George Mason University.

References

Hygiene and mental health among middle school students in India and 11 other countries


