Demographic and Clinical Characteristics of Adolescents in Hawaii With Obsessive-compulsive Disorder

Anthony P. S. Guerrero, MD; Earl S. Hishinuma, PhD; Naleen N. Andrade, MD; Cathy K. Bell, MD; David K. Kurahara, MD; Terry G. Lee, MD; Helen Turner, PhD; Jason Andrus, MD; Noelle Y. C. Yuen, MD; Alexander J. Stokes, MSc, HBO

Background: A high prevalence rate of obsessive-compulsive disorder (OCD) among Hawaiian adolescents, particularly Native Hawaiians, has been reported. Because Native Hawaiian and other Polynesian youth are at an increased risk for rheumatic fever, caused by an autoimmune response to group A β-hemolytic streptococci, we hypothesized that the genetic and environmental risk factors for streptococcal infections and their autoimmune sequelae potentially may be associated with the presence of OCD and may partially explain this high OCD prevalence.

Objective: To describe, among the adolescents in Hawaii diagnosed as having OCD through a previous study, OCD prevalence by ethnicity, household crowding and other measures of socioeconomic status, various measures of physical health and health-seeking behavior, and comorbid psychopathologic features.

Design: Six hundred nineteen adolescents from 5 high schools in the state of Hawaii were interviewed from April 15, 1993, to May 7, 1996. Interview instruments included the Diagnostic Interview Schedule for Children and other measurements of psychopathology. Obsessive-compulsive disorder diagnoses, based on current and past 6-month symptoms elicited via structured interview of the adolescents, were reported.

Results: Relative to other ethnicities, Native Hawaiians had a 2-fold higher risk (odds ratio = 2.03) for OCD. Degree of Polynesian ancestry correlated positively with OCD prevalence. Obsessive-compulsive disorder prevalence also correlated positively with crowding in the household; measures of physical illness; and measures of depression, anxiety, aggression, and illicit substance use.

Conclusions: The characteristics of OCD in this sample suggest the need to consider the possibility of a streptococcal origin and the need for further studies to clarify the genetic and environmental risk factors for OCD in Hawaiian and other Polynesian youth.

Studies–Depression Scale17). Given the criteria for these latter 29 had a sum score of 35 or more on the Center for Epidemiologic ing “tried to commit suicide” within the past 6 months, and who of the 1992-1993 school year cohort) who represented students order, affective disorders, and anxiety disorders.

The sample has been described in detail in earlier articles.12-16

A total of 619 adolescents were selected for interview from a other social variables among high school students in Hawaii. A total of 619 adolescents were selected for interview from a larger study that surveyed 7317 students, or 60% of the enrollment population of 5 high schools on 3 different islands in the state of Hawaii in the period from April 5, 1993, to May 7, 1996. The sample has been described in detail in earlier articles.

Participants for this study were selected in a modified random sampling composed of 590 randomly selected students (8.5% of the larger study) and 29 “at-risk” students (29 [0.70%] of 4164 of the 1992-1993 school year cohort) who represented students who responded positively to self, family member, or friend having “tried to commit suicide” within the past 6 months, and who had a sum score of 35 or more on the Center for Epidemiologic Studies–Depression Scale17. Given the criteria for these latter 29 adolescents, they were at risk for depression. There were 290 male and 329 female subjects, ranging in age (based on self-report) from 13 to 19 years, with a mean (SD) age of 15.80 (1.23) years.

Six mutually exclusive ethnic groups were formed—white, Filipino, Native Hawaiian or part Hawaiian, Japanese, mixed and non-Hawaiian, and other nonmixed. Because less than 1% of Na- tive Hawaiians are of nonmixed ancestry,38 Native Hawaiian (“Ha- waiian” hereafter) was defined as an adolescent with any Hawai- ian ancestry (ie, either parent with Hawaiian ancestry). Those of mixed ethnicity, but no Hawaiian ancestry were categorized as mixed and non-Hawaiians. There were only 6 adolescents who were of only 1 ancestry other than Hawaiian, white, Filipino, or Japanese.

Because of the small sample size for Samoans with no mixed ancestry (n=2) and the higher frequency of adolescents who were both part Samoan and part Hawaiian, the Samoan or part Samoan participants were examined from 3 of the ethnic groups (ie, 18 part Hawaiians, 5 mixed and non-Hawaiians, and 2 other nonmixed [Samoans with no mixed ancestry]). Because the Samoan or part Samoan group was not mutually exclusive to 3 of the 6 ethnic samples described above, data from the Samoan or part Samoan group were analyzed separately in comparison with the remain- ing participants. As a measure of Polynesian (ie, Hawaiian or Samoan) ancestry, a code of 0 was used for those with no Polynes- sian heritage; 1, for those who had at least some Polynesian an- cestry; and 2, for those who had only Polynesian ancestry.

MEASURES

Hawaiian Cultural Identification

This domain was measured by the following 2 indicators: (1) value Hawaiian traditions (“How much do you value Hawaiian beliefs, behaviors, and attitudes?”) and (2) maintain Hawaiian traditions (“How important is it to you to maintain Hawaiian cultural traditions?”) rated on a scale from 1 (not at all) to 5 (very much). These 2 measures have been found to be reliable and valid indicators of Hawaiian cultural identification.

Diagnosing OCD

The Diagnostic Interview Schedule for Children (DISC, Com- puterized Version 2.3)10-22 was administered to the adoles- cents through lay-performed, face-to-face, structured interviews at the school site and was used to diagnose OCD based on current and the past 6-month symptoms and functional impair- ment according to the Diagnostic and Statistical Manual of Mental Disorders, Revised Third Edition.

Crowding in the Household and Other Measures of SES

Crowding was measured by, “How many people live in your home?” Two indicators of SES were used. First, the main wage earners’ education was determined based on collapsing 7 catego- ries of education into 4: (1) less than high school, (2) high school graduate or General Educational Development certificate, (3) some college or community college, and (4) college graduate, master’s degree, or doctoral degree (PhD, medical, law). Second, the main wage earners’ employment status was defined based on collapsing 7 categories of employment into 4: (1) unemployed, wage, or disability; (2) employed part-time or retired; (3) self-employed or own business or farm; and (4) employed full-time.

Physical Health and Health-Seeking Behavior

Five indicators were used: (1) “During the last month, how much has your physical health worried or concerned you?” (1, not at all concerned; 5, very much concerned). (2) “Do you think you are healthier than most people your age, not as healthy as most of them, or do you think that your health is just about the same as most people your age?” (1, not as healthy as others; 5, healthier than others). (3) “In the past 6 months, how many times have you gone to see a nurse or doctor?” (1, never; 5, ≥5 times). (4) “In the past 6 months, how many times have you gone to see a Na- tive Hawaiian healer (eg, a kahuna lapa’au)” (1, never; 5, ≥5 times). (5) “During the past month of school, how many days were you absent because you were sick?” (1, none; 3, ≥8 days).

Psychopathologic Features

Adjustment difficulties were assessed using: (1) the Center for Epide- miologic Studies–Depression Scale for depressive symptoms (total score=0-60)17; (2) the State subscale of the State-Trait Anxiety Inventory for Adults for anxiety symptoms (total score=0-60)24; (3) the Braver Aggressiveness Dimension Scale for aggressive symp- toms (total score=0-28)25; (4) the Substance Abuse Subtle Screen- ing Inventory–Adolescent version (6 face-valid items from the entire inventory for substance use; total score=0-6)26; (5) “I have used alcohol or ‘pot’ too much or too often” (false: 0; true: 1; 1 of 6 items from the Substance Abuse Subtle Screening Inventory–Adolescent version); (6) “During the last month, how much has your mental (emotional) health worried or concerned you?” (rated on a 5-point scale where 1 indicated not at all concerned; 5, very much concerned); (7) “When did you last have counseling (dor- mitory counselor, school counselor, testing for personal problems), or any other mental health service?” (rated on a 5-point scale where
OCD prevalence rates were as follows: no Hawaiian ancestry, 8.2%; some Polynesian ancestry, 15.1%; and 100% Hawaiian ancestry, 33.3%. The positive association between OCD prevalence and degree of Hawaiian ancestry remained statistically significant (Table 2), with a greater than 2-fold increase for each unit increase in Polynesian ancestry (Table 2). The OR of 1.63 indicated that for every unit increase in Hawaiian ancestry (eg, going from no Hawaiian ancestry to <50% Hawaiian ancestry), there was a 1.63-fold increase in risk for OCD.

Based on the degree of Polynesian ancestry, OCD prevalence rates were: no Polynesian ancestry, 7.6% (18/237); some Polynesian ancestry, 15.1% (51/338); and only Polynesian ancestry, 33.3% (3/9). The positive association between Polynesian ancestry and OCD prevalence rates was statistically significant (Table 2), with a greater than 2-fold increase for each unit increase in Polynesian ancestry.

There were significant positive associations with the OCD rates and the 2 indicators of Hawaiian cultural identification (Table 2). For example, the OCD rates for the adolescents whose ratings were from 1 through 3 on the maintain item were 7.84%, 8.82%, and 8.95%, respectively; whereas the OCD rates for those whose ratings were 4 and 5 were 14.91% (24/161) and 16.06% (22/137), respectively.

Similarly, the OCD rates for the students whose ratings were from 1 through 3 on the maintain item were 7.84%, 7.87%, and 7.74%, respectively; whereas the OCD rates for those whose ratings were 4 and 5 were 12.42% (19/153) and 20.00% (31/155), respectively.

To determine whether Hawaiian ancestry, Hawaiian cultural identification, or both were uniquely associated with the OCD rates, a series of multiple logistic regression analyses were performed. When both Hawaiian ancestry (0%-100% Hawaiian heritage) and a valuing of Hawaiian traditions were entered into the model, only Hawaiian ancestry remained significantly associated with OCD rates (Hawaiian ancestry, Wald $\chi^2$[1] = 6.70, $R^2 = 0.015, P = .01$, OR = 1.53 [95% confidence interval (CI), 1.11-2.12]; value Hawaiian traditions, Wald $\chi^2$[1] = 0.95, $R^2 = 0.002, P = .33$, OR = 1.12 [95% CI, 0.89-1.42]). However, when Hawaiian ancestry and maintaining Hawaiian traditions were en-

### Table 1. Unweighted Prevalence Rates of Obsessive-compulsive Disorder by Ethnic Group for 619 Participants

<table>
<thead>
<tr>
<th>Ethnic Group</th>
<th>Fractions</th>
<th>Prevalence, %</th>
<th>$\chi^2$</th>
<th>$R^2$</th>
<th>Odds Ratio</th>
<th>Odds Ratio 95% CI</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>67/619</td>
<td>12.0</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Filipino</td>
<td>6/39</td>
<td>16.0</td>
<td>0.75</td>
<td>0.001</td>
<td>&lt;0.001</td>
<td>1.53 [1.11-2.12]</td>
<td>.001</td>
</tr>
<tr>
<td>Hawaiian or part Hawaiian</td>
<td>22/251</td>
<td>8.8</td>
<td>0.03</td>
<td>0.003</td>
<td>0.89</td>
<td>0.60 [0.37-1.37]</td>
<td>.33</td>
</tr>
<tr>
<td>Japanese</td>
<td>9/64</td>
<td>14.1</td>
<td>0.41</td>
<td>0.001</td>
<td>0.42</td>
<td>0.23 [0.12-0.46]</td>
<td>.01</td>
</tr>
<tr>
<td>Mixed/non-Hawaiian</td>
<td>2/12</td>
<td>16.7</td>
<td>0.07</td>
<td>0.001</td>
<td>0.43</td>
<td>0.22 [0.09-0.51]</td>
<td>.001</td>
</tr>
<tr>
<td>Samoan or part Samoan§</td>
<td>0/6</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

### RESULTS

#### PREVALENCES OF CURRENT OCD

Table 1 lists the fractions, unweighted prevalence rates (not adjusting for the 29 at-risk students), and univariate logistic regression results for each ethnic group. The overall prevalence was 12.0% (74/619). Hawaiians and Samoans were the only ethnic groups with odds ratios (ORs) greater than 1.0, with Hawaiians having a 2-fold (OR=2.03) risk compared with non-Hawaiians.

Based on the degree of Hawaiian ancestry, OCD prevalence rates were as follows: no Hawaiian ancestry, 8.2% (21/256); less than 50% Hawaiian, 11.3% (22/194); 50% or more Hawaiian (but <100%), 18.9% (27/143); and 100% Hawaiian, 33.3% (1/3). When these 4 categories were treated as a continuous variable, univariate logistic regression analysis revealed a statistically significant association between OCD prevalence and degree of Hawaiian ancestry (Table 2). The OR of 1.63 indicated that for every unit increase in Hawaiian ancestry (eg, going from no Hawaiian ancestry to <50% Hawaiian ancestry), there was a 1.63-fold increase in risk for OCD.

Based on the degree of Polynesian ancestry, OCD prevalence rates were: no Polynesian ancestry, 7.6% (18/237); some Polynesian ancestry, 15.1% (51/338); and only Polynesian ancestry, 33.3% (3/9). The positive association between Polynesian ancestry and OCD prevalence rates was statistically significant (Table 2), with a greater than 2-fold increase for each unit increase in Polynesian ancestry.

There were significant positive associations with the OCD rates and the 2 indicators of Hawaiian cultural identification (Table 2). For example, the OCD rates for the adolescents whose ratings were from 1 through 3 on the maintain item were 7.84%, 8.82%, and 8.95%, respectively; whereas the OCD rates for those whose ratings were 4 and 5 were 14.91% (24/161) and 16.06% (22/137), respectively.

Similarly, the OCD rates for the students whose ratings were from 1 through 3 on the maintain item were 7.84%, 7.87%, and 7.74%, respectively; whereas the OCD rates for those whose ratings were 4 and 5 were 12.42% (19/153) and 20.00% (31/155), respectively.

To determine whether Hawaiian ancestry, Hawaiian cultural identification, or both were uniquely associated with the OCD rates, a series of multiple logistic regression analyses were performed. When both Hawaiian ancestry (0%-100% Hawaiian heritage) and a valuing of Hawaiian traditions were entered into the model, only Hawaiian ancestry remained significantly associated with OCD rates (Hawaiian ancestry, Wald $\chi^2$[1] = 6.70, $R^2 = 0.015, P = .01$, OR = 1.53 [95% confidence interval (CI), 1.11-2.12]; value Hawaiian traditions, Wald $\chi^2$[1] = 0.95, $R^2 = 0.002, P = .33$, OR = 1.12 [95% CI, 0.89-1.42]). However, when Hawaiian ancestry and maintaining Hawaiian traditions were en-
The prevalence rates among male and female participants in the study sample were 7.2% (212/290) and 16.1% (53/329), respectively. The association between age and OCD was not statistically significant (data not shown).

CROWDING IN THE HOUSEHOLD AND OTHER MEASURES OF SES

The mean (SD) and sample size of the number of people in the home were calculated for each of the mutually exclusive ethnic groups. The following results were obtained: white, 3.46 (0.97), n = 13; Filipino, 5.96 (2.03), n = 26; Hawaiian, 5.42 (2.28), n = 279; Japanese, 3.96 (1.15), n = 45; mixed or non-Hawaiian, 4.33 (1.57), n = 85; and other nonmixed, 7.00 (4.58), n = 3. The overall F ratio of a multiple regression analysis comparing the different means was statistically significant (F[subject] = 9.69, P < .001). A Newman–Keuls subsequent test revealed the following significant differences: (1) other ethnic groups exceeding mixed and non-Hawaiian, Japanese, and white and (2) Filipino exceeding white. When examining the association between the number of people in the home and OCD diagnosis, the greater the number of people in the home, the higher the OCD prevalence (Table 2). The prevalence rates by the main wage earners’ education were as follows: less than high school, 20.0% (9/45); high school graduate, 15.6% (24/154); some college, 11.0% (16/146); and college graduate or higher, 10.7% (21/196). There was a trend whereby the lower the main wage earners’ education, the higher the OCD rate (Table 2).

The prevalence rates by the main wage earners’ employment status were as follows: unemployed or receiving welfare or disability, 16.7% (7/42); employed part-time or retired, 13.3% (8/60); self-employed or own business or farm, 15.3% (9/59); and employed full-time, 11.9% (49/413). There was no significant relation between OCD prevalence and employment status (Table 2).

Table 2. Associations With Obsessive-compulsive Disorder Based on Univariate Logistic Regression Analyses

<table>
<thead>
<tr>
<th>Variables</th>
<th>$\chi^2$ Test</th>
<th>df</th>
<th>$R^2$</th>
<th>Odds Ratio</th>
<th>Odds Ratio 95% Confidence Interval</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hawaiian ancestry (0%-100%)</td>
<td>10.22</td>
<td>1,596</td>
<td>0.023</td>
<td>1.63</td>
<td>1.21-2.21</td>
<td>.001</td>
</tr>
<tr>
<td>Polynesian ancestry</td>
<td>10.41</td>
<td>1,584</td>
<td>0.024</td>
<td>2.25</td>
<td>1.35-3.75</td>
<td>.001</td>
</tr>
<tr>
<td>Value Hawaiian traditions</td>
<td>5.19</td>
<td>1,604</td>
<td>0.012</td>
<td>1.28</td>
<td>1.03-1.60</td>
<td>.02</td>
</tr>
<tr>
<td>Maintain Hawaiian traditions</td>
<td>11.53</td>
<td>1,603</td>
<td>0.026</td>
<td>1.44</td>
<td>1.15-1.79</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Crowding and other SES measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of people in the home</td>
<td>6.19</td>
<td>1,454</td>
<td>0.020</td>
<td>1.17</td>
<td>1.04-1.31</td>
<td>.01</td>
</tr>
<tr>
<td>Main wage earner’s education†</td>
<td>3.64</td>
<td>1,541</td>
<td>0.009</td>
<td>0.78</td>
<td>0.61-1.01</td>
<td>.06</td>
</tr>
<tr>
<td>Main wage earner’s education‡</td>
<td>4.09</td>
<td>3,541</td>
<td>0.010</td>
<td>NA</td>
<td>NA</td>
<td>.25</td>
</tr>
<tr>
<td>Main wage earner’s employment status†</td>
<td>0.87</td>
<td>1,574</td>
<td>0.007</td>
<td>0.89</td>
<td>0.70-1.13</td>
<td>.36</td>
</tr>
<tr>
<td>Main wage earner’s employment status‡</td>
<td>1.17</td>
<td>3,574</td>
<td>0.003</td>
<td>NA</td>
<td>NA</td>
<td>.76</td>
</tr>
<tr>
<td>Physical health and health-seeking behavior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worried/concerned about physical health</td>
<td>16.08</td>
<td>1,617</td>
<td>0.036</td>
<td>1.49</td>
<td>1.23-1.82</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Healthier than most</td>
<td>6.33</td>
<td>1,609</td>
<td>0.014</td>
<td>0.88</td>
<td>0.50-0.92</td>
<td>.01</td>
</tr>
<tr>
<td>Saw nurse or physician</td>
<td>4.74</td>
<td>1,610</td>
<td>0.011</td>
<td>1.26</td>
<td>1.03-1.54</td>
<td>.03</td>
</tr>
<tr>
<td>Saw Native Hawaiian healer</td>
<td>4.89</td>
<td>1,607</td>
<td>0.011</td>
<td>1.46</td>
<td>1.07-2.00</td>
<td>.03</td>
</tr>
<tr>
<td>Absent because sick</td>
<td>8.26</td>
<td>1,610</td>
<td>0.018</td>
<td>1.33</td>
<td>1.10-1.61</td>
<td>.004</td>
</tr>
<tr>
<td>Psychopathologic features</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>37.99</td>
<td>1,580</td>
<td>0.090</td>
<td>1.06</td>
<td>1.04-1.08</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Anxiety</td>
<td>23.39</td>
<td>1,582</td>
<td>0.055</td>
<td>1.06</td>
<td>1.03-1.10</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Aggression</td>
<td>29.38</td>
<td>1,599</td>
<td>0.066</td>
<td>1.12</td>
<td>1.08-1.17</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Illicit substance use</td>
<td>10.23</td>
<td>1,585</td>
<td>0.024</td>
<td>1.35</td>
<td>1.13-1.60</td>
<td>.001</td>
</tr>
<tr>
<td>Use alcohol or “marijuana” too much or often</td>
<td>6.82</td>
<td>1,586</td>
<td>0.016</td>
<td>2.34</td>
<td>1.28-4.30</td>
<td>.009</td>
</tr>
<tr>
<td>Worried or concerned about mental health</td>
<td>19.96</td>
<td>1,615</td>
<td>0.045</td>
<td>1.54</td>
<td>1.27-1.86</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Had counseling or other mental health services</td>
<td>10.97</td>
<td>1,602</td>
<td>0.025</td>
<td>1.30</td>
<td>1.12-1.52</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>DISC ADHD</td>
<td>7.64</td>
<td>1,607</td>
<td>0.018</td>
<td>5.03</td>
<td>1.77-14.31</td>
<td>.006</td>
</tr>
<tr>
<td>DISC movement disorders§</td>
<td>0.54</td>
<td>1,148</td>
<td>0.004</td>
<td>2.65</td>
<td>0.23-30.47</td>
<td>.46</td>
</tr>
<tr>
<td>DISC marijuana abuse or dependency</td>
<td>0.70</td>
<td>1,614</td>
<td>0.002</td>
<td>1.50</td>
<td>0.60-3.73</td>
<td>.40</td>
</tr>
<tr>
<td>Self-reported academic grades</td>
<td>3.61</td>
<td>1,562</td>
<td>0.009</td>
<td>0.72</td>
<td>0.52-1.01</td>
<td>.06</td>
</tr>
</tbody>
</table>

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; DISC, Diagnostic Interview Schedule for Children; NA, not applicable; SES, socioeconomic status.

* $\chi^2(2)$ (log likelihood).
† Item treated as a continuous variable.
‡ Item treated as a categorical variable.
§ DISC movement disorders were assessed for only 1993; thus the smaller n size.
PHYSICAL HEALTH AND HEALTH-SEEKING BEHAVIOR

All 5 physical-health indicators were significantly associated with the presence of OCD, with better physical health related to lower levels of OCD (Table 2).

PSYCHOPATHOLOGIC FEATURES

Table 2 summarizes the 11 psychopathologic variables in association with OCD presence. Only DISC movement disorders, DISC marijuana abuse or dependency, and self-reported academic grades were not significantly associated with OCD although the latter variable indicated a trend ($P = .057$). Depressive, anxiety, and aggressive symptoms accounted for the largest variance ($R^2$).

Obsessive-compulsive disorder prevalence rates for the dichotomous variables were as follows: (1) Substance Abuse Subtle Screening Inventory—Adolescent version item on alcohol or pot use (no, 10.6% [54/508]; yes, 21.8% [17/78]); (2) DISC attention-deficit/hyperactivity disorder (no, 10.7% [63/591]; yes, 37.5% [6/16]); (3) DISC movement disorders (no, 15.9% [23/145]; yes, 33.3% [13]); and (4) DISC marijuana abuse or dependency (no, 11.1% [64/576]; yes, 15.8% [6/38]).

The ethnic differences in OCD prevalence are striking, bearing some resemblance to the pattern of risks for rheumatic fever in Hawaii27,28 and Samoa.27 The highest risks are in Samoans (relative risks [RRs] of 10.8, 88.0, and 56.0 in the Chun et al7 1976-1980, 1980-1984, and 1984-1988 data sets, respectively) and Hawaiians (RRs of 3.0, 7.7, and 11.7, respectively), a possibly increased risk in Filipinos (RRs of 1.0, 1.9, and 1.0, respectively; with a high OR in the Kurahara data26), and lower risks in whites (RRs of 1.0, 1.0, and 1.0, respectively), and Japanese (RRs of 0.8, and 0). In comparison with youth of other ethnicities, Hawaiians and Samoans may be at significantly higher risk for both OCD and rheumatic fever. The correlation between Hawaiian and other Polynesian blood quantum and risk for OCD suggests the need to consider concurrent hereditary factors that predispose to both conditions via separate mechanisms (Cheadle28 for a report, from 1889, on the apparent tendency of rheumatic fever to be inherited, along with a tendency toward “nervous excitability”) or immunogenetic factors (Kurahara et al28) that might predispose to both rheumatic fever and streptococcal-related OCD.

Cultural factors that possibly affect detection of OCD via the DISC may also need to be considered, although measures of Hawaiian cultural identification did not consistently predict OCD rate beyond Hawaiian ancestry. Furthermore, a separate analysis (data not shown) of individual OCD criteria did not reveal any significant differences between Hawaiians and non-Hawaiians, and selected members of our Native Hawaiian Mental Health Research team, on careful review of the DISC, did not believe that Hawaiian adolescents might misinterpret any of the questions.

Environmental factors may also explain the high OCD rate. In our study, the number of people in the household correlated significantly with OCD, while other measures of SES did not. This significant correlation seems to be consistent with the hypothesis of an infectious cause, although it is possible that other factors, not elucidated in this study, may correlate with both OCD and household crowding specifically.

The positive correlation between OCD, physical health problems, physician and other healer visits, and school absences may suggest that youth with OCD, tend to worry about their physical health and seek medical attention from various sources; or that these youth have a higher rate of exposure to infections that could exacerbate OCD. Unfortunately, the data set also did not include any information about the specifics of the health concerns or medical visits or about family history of rheumatic fever.

Our finding of comorbidity between OCD and depressive symptoms, anxiety symptoms, and aggressive symptoms is similar to findings from previous studies of postinfectious and other subtypes of OCD.29 In our study, symptoms of depression was the single best predictor of OCD prevalence. These results suggest the need to consider comorbid illnesses in youth who have OCD and/or to consider OCD and its possible origins in children who initially have symptoms of anxiety, depression, or aggression.

If a poststreptococcal autoimmune neuropsychiatric syndrome had affected a significant portion of our study sample, then we might have expected mostly prepubertal onset of OCD, a high prevalence of tics, and a high rate of comorbidity between OCD and tics. However, our study was limited by the unavailability of any information about remote history of OCD symptoms and tics and by the absence of any other assessments for tics (which may not be optimally measured by self-report). Future studies would need to include a larger sample, other clinical evaluation, and a broader age spectrum, and/or additional information about longitudinal course of OCD symptoms and tics29 to more satisfactorily assess this possibility.

Limitations of our study include the few subjects in certain ethnic categories (eg, Samoan); the possibility that the unavailability of the students absent from school may have artificially reduced findings of psychopathologic conditions; the lack of any confirmatory information collected from parents, medical records, and other sources; and the unavailability of specific data that might have enabled clarification of certain hypotheses. A further limitation was the inclusion of the 29 at-risk participants coupled with not using weights. This was done to maintain the sample size, and the weights were not used given the smaller groupings of participants in the present investigation. The end result is that the OCD prevalence rates reported were slight overestimates. However, although the 29 at-risk participants had a significantly higher prevalence of OCD (11 [37.9%] of 29 subjects) compared with the remaining adolescents (63 [10.7%] of 590 subjects) (univariate logistic regression $\chi^2 = 13.6, P < .001$, OR = 5.1, OR 95% CI, 2.3-11.3), the 10.7% rate for the remaining sample was still high relative to previously reported rates. In addition, being in the at-risk group was not significantly related to being in the Hawaiian (logistic $\chi^2 = 0.00$, $P = .95$), Samoan (logistic $\chi^2 = 0.03$, $P = .85$), or Polynesian groups (logistic $\chi^2 = 0.00$, $P = .98$).

An additional issue is to consider the reliability and validity of the DISC OCD diagnosis in light of the high rates.
Clinical interview (performed by one of us [N.N.A.]) of 5 of the adolescents diagnosed as having OCD via the DISC, provided confirmation of the diagnosis. However, this study did not include parental interviews, which could have improved the sensitivity of the DISC, and did not include confirmatory clinical interviews of all adolescents diagnosed with OCD. Although further research on the validity of the DISC and the OCD diagnosis in Polynesian youth is warranted, clinical interview of 5 Polynesian youth is warranted, Horwath and Weissman, using the structured Diagnostic Interview Schedule, found consistent patterns of OCD prevalence in their cross-national sample. The findings of the present study (eg, correlations with psychiatric symptoms) would suggest that the DISC OCD diagnosis is reliable and valid, and the relatively large sample with an OCD diagnosis may provide further opportunities to validate this instrument.

CONCLUSIONS

Overall, our findings of increased OCD risk with Polynesian ethnicity and association with household crowding and physical illness suggest the need to consider the possibility of a streptococcal origin and the need for further studies to clarify other causative factors, especially among the Hawaiian and Samoan populations.

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Corresponding author and reprints: Anthony P. Guerero, MD, Department of Psychiatry, John A. Burns School of Medicine, University of Hawaii, Queen’s University Tower, Fourth Floor, 1336 Lusitana St, Honolulu, HI 96813 (e-mail: guerreroA@dop.hawaii.edu).

REFERENCES


What This Study Adds

Streptococcal infections have been shown to be causative in a subgroup of pediatric patients with OCD. Native Hawaiian and other Polynesian youth are at an increased risk for streptococcal infections and their autoimmune sequelae. To our knowledge, this pilot, retrospective analysis is the first study to describe OCD occurring in a multiethnic sample in Hawaii. This study found an increased OCD risk with factors that are also associated with increased rheumatic fever risk, including Polynesian ancestry and apparent household crowding. Although these findings are preliminary, they suggest the need for further studies.

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