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Oral health status and risk of potentially malignant lesions in patients with severe mental illnesses: a cross-sectional study

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ABSTRACT

Aims: Individuals with severe mental illness (SMI) experience disproportionately poor oral health due to behavioral, pharmacological, and systemic challenges. This study aimed to assess the oral health status of patients with SMI using the oral health assessment tool (OHAT) and the Decayed, Missing, and Filled Teeth (DMFT) Index, and to screen for oral potentially malignant lesions (OPMLs).

Methods: A cross-sectional study was conducted with 60 patients registered at the Community Mental Health Center in Kocaeli, Turkiye. Comprehensive clinical examinations were performed using the Turkish version of the OHAT and the DMFT Index. The presence of OPMLs was also recorded. Statistical analyses included descriptive statistics, independent t-tests for gender comparisons, and Pearson correlation analyses to explore associations between age, OHAT, and DMFT scores.

Results: Participants (mean age: 47.6±11.5 years; 65% female) had a mean OHAT score of 9.15±2.39 and a mean DMFT score of 13.5±7.00. No significant gender differences were observed in total OHAT or DMFT scores. However, females had significantly more filled teeth than males (3.08±2.04 vs. 1.57±1.80; p=0.006). Age was moderately correlated with OHAT (r=0.318, p=0.013) and strongly correlated with DMFT (r=0.449, p<0.001). OHAT and DMFT scores were also significantly correlated (r=0.502, p<0.001). Fifteen soft tissue lesions were detected, including leukoplakia, lichen planus, and angular cheilitis.

Discussion: This study showed a high burden of oral disease and soft tissue lesions among patients with SMI, exceeding levels reported in non-psychiatric and geriatric populations. The findings emphasize the need for interdisciplinary care models incorporating routine dental screening, preventive interventions, and education within mental health services.

Keywords: Oral health, severe mental illness, oral potentially malignant lesions, OHAT

INTRODUCTION

Severe mental illness (SMI), including conditions such as schizophrenia, psychotic disorders, bipolar disorder, and treatment-resistant depression, has profound effects not only on psychological functioning but also on physical health and overall quality of life.[1] Individuals living with SMI frequently experience complex challenges, including recurrent hospitalizations, co-occurring substance use disorders, and social disadvantages such as homelessness, unemployment, and reduced access to healthcare services. The pharmacological management of these disorders typically involves long-term use of antipsychotics, antidepressants, mood stabilizers, and anxiolytics, many of which can contribute to negative oral health outcomes.[2,3]

There is growing evidence that individuals with SMI are disproportionately affected by oral diseases. A recent systematic review revealed that individuals with SMI has 2.8 times greater odds of being edentulous compared to the general population and experiences an average of five more decayed, missing, or filled teeth per person. Several contributing factors explain this disparity.[1-3] Behavioral risk factors such as poor dietary habits (e.g., high sugar intake), substance and tobacco use, and alcohol consumption are more common among individuals with SMI. Additionally, psychotropic medications frequently induce xerostomia (dry mouth), a well-established risk factor for dental caries and periodontal disease.[4,5]

Beyond physiological contributors, people with SMI face significant psychosocial barriers to accessing oral care. These include lack of motivation, fear or anxiety about dental treatment, negative experiences with healthcare providers, and the financial burden of dental services. Such barriers often lead to delayed care or complete neglect of oral health.[1,3] The consequences of poor oral health in this population extend beyond the oral cavity. Oral diseases can impact fundamental daily functions such as chewing and speaking,

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which in turn affect nutritional intake and communication. Furthermore, poor oral hygiene has been associated with systemic conditions including diabetes mellitus, pneumonia, and cardiovascular disease. It also significantly influences psychological wellbeing, affecting self-esteem, social interactions, and overall quality of life.[3-5]

In addition to behavioral and pharmacological factors, individuals with SMI face both intrinsic and external barriers to maintaining oral hygiene.[6,7] Intrinsic challenges include lack of motivation, reduced awareness, difficulty adhering to treatment plans, cognitive impairments, and fluctuations in mental state.[7,8] Externally, limited access to dental care, high treatment costs, dental anxiety, stigma, and inadequate referrals from mental health professionals further contribute to poor oral health. These systemic and personal challenges underscore the urgent need for integrated, interdisciplinary approaches and tailored oral health interventions within mental health care settings.[7,9]

Given the relation between mental illness and oral health, there is a critical need to assess and address the oral health status of individuals with SMI in a structured and evidence-based manner.[6] The present study aims to evaluate the oral health condition of patients with severe mental illness using the oral health assessment tool (OHAT) and the Decayed, Missing, and Filled Teeth (DMFT) Index. In addition, the study investigates the presence of oral soft tissue lesions, including oral cancer and oral potentially malignant lesions (OPMLs), which may otherwise go unnoticed in this group.

METHODS

Ethics

This cross-sectional study was conducted with patients registered at Community Mental Health Center, Kocaeli, Turkiye. Ethical approval was obtained from the Kocaeli Health and Technology University Non-interventional Researches Ethics Committee (Date: 10.10.2024, Decision No: 2024-100). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. All participants (or their legal guardians, where necessary) provided informed consent prior to the examinations.

Clinical Examination

Each participant underwent a comprehensive oral health evaluation performed by two dental specialists and one medical specialist trained in the recognition of oral soft tissue lesions. Radiological examination was not performed. The Turkish version of the OHAT, validated by Ercan Şahin and Jablonski,[10] was used to assess general oral health. Additionally, the DMFT index (excluding third molars) was recorded, and all patients were screened for oral potentially malignant lesions (OPMLs).

According to OHAT and DMFT indices the following criteria were assessed:

Oral Health Assessment Tool (OHAT) Parameters

The OHAT evaluates eight key oral health parameters using a standardized 3-point scale (0-1-2), where 0 indicates a healthy condition, 1 indicates mild changes requiring monitoring, and 2 indicates unhealthy conditions needing immediate attention (**Table 1**).

The first parameter, lips, is assessed for integrity and appearance; smooth, moist, and pink lips are considered healthy (score 0), while dryness or chapping scores 1, and swelling, ulceration, or lesions receive a score of 2. The tongue is evaluated based on moisture, coating, and color; a normal, moist, pink tongue is healthy (score 0), while patchiness or slight coating scores 1, and ulceration, swelling, or abnormal coloration is scored as 2. The gingiva and oral mucosa are checked for color, moisture, and signs of inflammation; healthy pink and moist tissue is scored 0, mild redness or swelling is scored 1, and spontaneous bleeding, ulceration, or red/white patches are scored 2. Saliva assessment considers flow and moisture; normal moisture earns a score of 0, slight dryness or sticky saliva is scored 1, and severe dryness or absence of saliva is scored 2.

Natural teeth are evaluated for integrity and presence of decay; patients with intact dentition and no visible decay receive a score of 0, those with 1–3 decayed or broken teeth score 1, and those with 4 or more decayed or missing teeth score 2. The denture category assesses the presence, cleanliness, and fit of removable prosthetics; well-fitting and clean dentures or those not needed score 0, ill-fitting or dirty dentures score 1,

Table 1. Oral health assessment tool scoring criteria

Parameter	Score 0-healthy	Score 1-mild change	Score 2-unhealthy/severe change
1. Lips	Smooth, pink, moist	Dry, chapped, cracked corners	Swollen, ulcerated, bleeding, or visible lesions
2. Tongue	Normal appearance, moist, pink, no coating	Irregular coating, patchy, fissured, or slight redness	Swollen, ulcerated, patchy, abnormal color or severe discoloration
3. Gingiva/mucosa	Pink, moist, firm, no swelling or bleeding	Red, mildly swollen, minor ulcers or irritation	Bleeding, severely inflamed, ulcerated, red/white patches
4. Saliva	Normal moisture; saliva easily observed	Dry mouth sensation; thick/sticky saliva	Extremely dry oral cavity, no visible saliva
5. Natural teeth	All teeth intact, no decay or damage	1-3 decayed or broken teeth	4 or more decayed, broken, or missing teeth
6. Dentures	Clean, well-fitting dentures; or not needed	Ill-fitting or unclean dentures worn	Dentures needed but not worn, very dirty or loose dentures
7. Oral hygiene	Clean oral cavity, no debris, no calculus	Minor food debris, some plaque or calculus	Heavy debris, thick plaque, extensive calculus
8. Dental pain	No signs or reports of pain	Occasional verbal or non-verbal signs of discomfort	Frequent or constant pain, visible distress, refusal to eat or touch oral region

and needed but unworn or severely dirty dentures are scored 2. Oral hygiene is evaluated by the presence of debris and plaque; a clean mouth scores 0, minor deposits score 1, and heavy plaque, calculus, or food debris scores 2. Lastly, dental pain is scored based on signs of discomfort; absence of pain scores 0, occasional signs of discomfort score 1, and frequent or severe pain that impacts eating or behavior is scored 2.

DMFT Index

The DMFT Index was recorded for all participants, excluding third molars:

- **D (decayed):** Number of carious teeth.
- **M (missing):** Number of teeth lost due to caries or extraction.
- **F (filled):** Number of restored teeth.
- **Total DMFT:** Sum of D, M, and F components.

Oral Cancer and Oral Potentially Malignant Lesions

A thorough intraoral soft tissue examination was conducted to detect any OPMLs such as leukoplakia, erythroplakia, oral lichen planus, or other suspicious lesions. Lesions were documented and photographed when necessary for further evaluation.

Statistical Analysis

All data analyses were performed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize demographic variables, OHAT scores, and DMFT indices. Continuous variables such as age, OHAT total score, and DMFT score were expressed as mean±standard deviation (SD), while categorical variables such as gender were reported as counts and percentages. To evaluate gender-based differences in OHAT and DMFT scores, independent samples t-tests were applied. The level of statistical significance was set at $p<0.05$. The relationships between: Age and OHAT score, Age and DMFT score, OHAT and DMFT scores were assessed using Pearson's correlation coefficient (r). The strength of correlation was interpreted as follows: r=0.1-0.3: weak, r=0.3-0.5: moderate, r>0.5: strong correlation. A post hoc power analysis was conducted to evaluate the adequacy of the sample size for detecting the main effects examined in this study. For independent samples T tests (female vs. male comparisons; $n_1=39$, $n_2=21$), the sample provided 80% power to detect medium-to-large effect sizes (Cohen's $d\approx0.77$) at a two-tailed alpha level of 0.05. Smaller effects ($d\approx0.50$-0.60) would require larger sample sizes ($n_1\approx91$, $n_2\approx49$ for $d=0.50$). For Pearson correlation analyses, a sample of 60 participants provides 80% power to detect correlations of $|\rho| \geq 0.355$. Power calculations were performed using G*power (version 3.1.9.7; Heinrich Heine University Düsseldorf, Germany). All statistical tests were two-tailed, and results were considered statistically significant when p-values were less than 0.05.

RESULTS

A total of 60 patients (aged 33 to 80 years) from the Community Mental Health Center were included in the study. The mean age was 47.6±11.5 years. Of the participants, 39 (65%) were female and 21 (35%) were male (Table 2).

Table 2. Summary of age, gender distribution, and basic demographic characteristics of mentally ill patients included in the study

Variable	Mean±SD	Range
Age (years)	47.6±11.5	33-80
Female participants	39 (65%)	—
Male participants	21 (35%)	—

SD: Standard deviaiton

The overall mean OHAT score was 9.15±2.39, indicating moderate levels of oral health deterioration. No significant gender-based differences were observed in OHAT scores (females: 9.15±2.54; males: 9.14±2.15; p=0.987). Similarly, the total DMFT score showed no significant difference between females (14.23±6.70) and males (12.14±7.52; p=0.274). When components of the DMFT Index were analyzed separately, the decayed teeth (DT) and missing teeth (MT) scores did not differ significantly between genders (p=0.394 and p=0.828, respectively). However, the filled teeth (FT) score was significantly higher in females (3.08±2.04) than in males (1.57±1.80; p=0.006), suggesting more frequent utilization of restorative dental care among female participants (Table 3).

Table 3. Comparison of OHAT and DMFT scores by gender

Score	Total (n=60)	Females (n=39)	Males (n=21)	p-value*
OHAT	9.15±2.39	9.15±2.54	9.14±2.15	0.987
DMFT	13.5±7.00	14.23±6.70	12.14±7.52	0.274
DT	5.90±4.06	6.23±3.75	5.29±4.61	0.394
MT	5.05±6.10	4.92±7.00	5.29±4.09	0.828
FT	2.55±2.08	3.08±2.04	1.57±1.80	0.006

*Independent samples T test, OHAT: Oral health assessment tool, DMFT: Decayed, missing, and filled teeth, DT: Decayed teeth, MT: Missing teeth, FT: Filled teeth

Age showed a moderate positive correlation with OHAT scores (r=0.318, p=0.013) and a strong positive correlation with DMFT scores (r=0.449, p<0.001), indicating that both oral health status and tooth loss/decay deteriorate with increasing age. A moderate positive correlation was observed between OHAT and DMFT scores (r=0.502, p<0.001), suggesting that worse overall oral health was associated with a greater number of decayed, missing, or filled teeth (Table 4).

Table 4. Correlation analysis of age, OHAT, and DMFT scores

Variable pair	Pearson's r	p-value*
Age vs OHAT	0.318	0.013
Age vs DMFT	0.449	<0.001
OHAT vs DMFT	0.502	<0.001

*Pearson correlation, OHAT: Oral health assessment tool, DMFT: Decayed, missing, and filled teeth

A total of 15 oral soft tissue lesions were identified in the study population (25%). The detected lesions included leukoplakia, erosive lichen planus, pyogenic granuloma, angular cheilitis, hairy tongue, oral leukoedema (Figure). Erosive lichen planus and leukoplakia were classified as OPML and the prevalance of OMPLs were found as 3.3%. All affected patients were

informed about the findings and referred to dental clinics for further evaluation and treatment (Table 5).

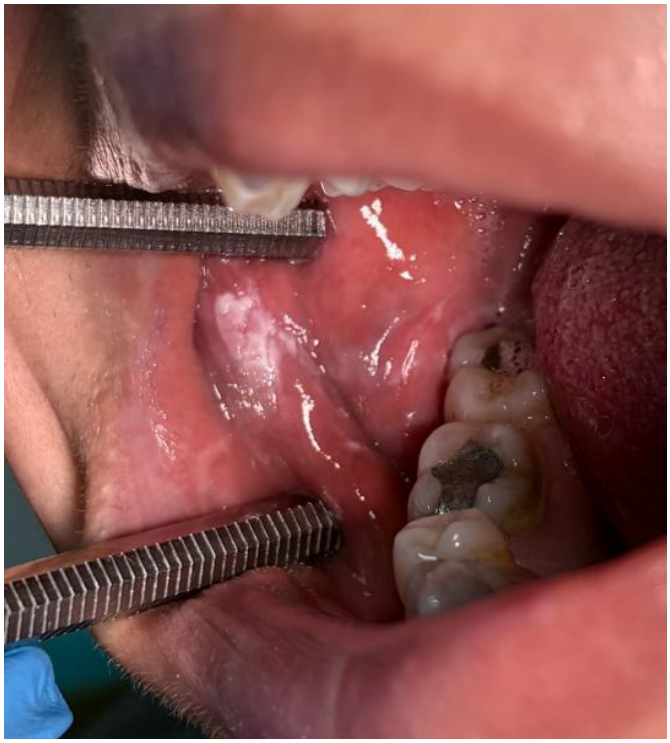

Figure. A well-defined white lesion on the right buccal mucosa, clinically suggestive of oral leukoplakia

The current sample demonstrated adequate power for detecting moderate-to-large differences and correlations. Specifically, gender comparisons had 80% power to detect Cohen's d≈0.77, which aligns with the medium-to-large effect range. For correlations, the sample size was sufficient to detect correlations of p≥0.355 with 80% power. Accordingly, the observed correlations between age and OHAT (r=0.318), age and DMFT (r=0.449), and OHAT and DMFT (r=0.502) indicate that moderate-to-strong correlations (e.g., age-DMFT, OHAT-DMFT) were well powered, whereas smaller correlations approach the detection threshold. Prevalence estimates for OPMLs (3.3%) and soft tissue lesions (25%) carry wide confidence intervals (OPML CI≈0.4%-11.5%).

DISCUSSION

This study further shows the connection between severe mental illness (SMI) and poor oral health. Using the OHAT and DMFT indices, we observed a high prevalence of dental caries, soft tissue lesions, and a notable number of potentially malignant lesions. Our findings are consistent with earlier research that has examined the two-way relationship between mental health and oral health. Kalaigian et al.[11] reported significant associations between internalizing symptoms and oral disease markers (e.g., bleeding gums, tooth extraction). Our results, showing correlations between OHAT and DMFT scores with age, support their conclusion that psychiatric symptoms may directly influence oral health and highlight the importance of integrated mental and dental care.

Torales et al.[12] emphasized medication effects, low self-care motivation, and dental avoidance in psychiatric populations. Similarly, our participants exhibited high DMFT scores (mean=13.5) and unmet dental needs, with common findings including caries, periodontal disease, and mucosal lesions. These parallels underscore the importance of preventive strategies and accessible dental services for this group.

Mishu et al.[13] identified stigma, negative dental experiences, and systemic barriers as reasons for low dental service use in SMI. Although we did not investigate subjective factors, the prevalence of untreated lesions indirectly reflects these obstacles. Their call for trauma-informed care and clinician training is supported by our observation that many participants had never undergone oral mucosal screening, emphasizing the need for integrated oral health education within mental health care.

Cross et al.[14] showed that periodontal treatment improved depression scores, illustrating the reverse relationship between oral and mental health. Although our study was not interventional, the high prevalence of soft tissue and periodontal disease supports this bidirectional model and highlights system-level challenges, including limited referrals and lack of protocols, consistent with Mishu et al.[13] and Cross et al.

There are various studies in the literature that used OHAT in different medical conditions.[15-17] Tabaoka et al.[15] examined the association between OHAT scores and the development of aspiration pneumonia in a general population but found no significant relationship. Tanaka et al.[16] conducted a study among older adults receiving home medical care and reported a mean OHAT score of 6.0. They found that approximately 70% of participants required tooth extraction, reflecting poor oral health. Compared to our sample (mean OHAT=9.15), the higher burden observed in patients with mental disorders may be attributed to reduced self-care abilities, and lower access to routine dental care.

Maeda et al.[17] provided compelling evidence linking OHAT scores with hospital mortality in geriatric patients. They found that patients with OHAT scores ≥3 had significantly higher

Table 5. Type, classification and anatomical locations of oral mucosal lesions

Lesion type	Classification	Anatomical location(s)	Notes/clinical features
Leukoplakia	OPML	Lateral tongue	White plaque, non-scrapable, referred for biopsy
Erosive oral lichen planus	OPML	Buccal mucosa (bilateral)	Erythematous patches with Wickham striae
Pyogenic granuloma	Benign	Gingiva	Red, pedunculated, ulcerated lesion
Angular cheilitis	Benign	Oral commissures	Erythematous fissuring at mouth corners
Hairy tongue	Benign	Dorsal tongue	Elongated filiform papillae, brown-black discoloration
Oral leukoedema	Benign	Buccal mucosa	White area in bilateral buccal mucosa

OPML: Oral potentially malignant lesion

in-hospital mortality rates. While their mean participant age was 83.8 years, substantially older than our sample (mean age: 47.6 years), our cohort's average OHAT score exceeded the threshold used in Maeda's risk stratification model. This suggests that even in a younger demographic, factors associated with mental illness can worsen the oral health status. The findings support the broader clinical relevance of OHAT, not only as a descriptive measure but as a potential prognostic tool.

Bokhari and Quadri[18] validated an Arabic version of the OHAT for adolescents and identified poor dental and gingival conditions associated with unhealthy dietary habits and poor hygiene. Although their study population (mean age: 16.3 years) differs substantially from ours, their findings highlight the role of behavioral factors-such as diet and oral hygiene practices-in shaping oral health outcomes. In our study, females had significantly higher numbers of filled teeth (FT: 3.08±2.04 vs. 1.57±1.80 in males; p=0.006), suggesting better dental care utilization among women. This gender-based difference echoes Bokhari and Quadri's conclusion that oral hygiene behaviors critically influence oral health, regardless of demographic or cultural differences.

Oral potentially malignant lesions (OPMLs) are clinically identifiable mucosal abnormalities that carry a measurable risk of malignant transformation, often progressing to oral squamous cell carcinoma if left undetected.[19] These lesions may present asymptomatically, making early identification during routine examinations particularly challenging yet crucial.[20,21] Common OPMLs include leukoplakia, erythroplakia, oral lichen planus (especially the erosive type), and actinic cheilitis, among others. The progression risk varies by lesion type, anatomical location, patient habits (e.g., tobacco or alcohol use), and comorbid conditions.[19] Thus, systematic screening and timely referral play a critical role in early intervention and prevention of oral cancer.[20,21]

In addition to the OHAT and DMFT indices used to evaluate general oral health, this study incorporated a structured screening protocol for oral cancer and OPMLs. Among the 60 patients examined, 15 individuals (25%) were found to have oral soft tissue lesions, and of these, two lesions-one leukoplakia and one erosive oral lichen planus-were classified as OPMLs. This 3.3% prevalence of OPMLs within a high-risk psychiatric population is clinically significant and underscores the need for targeted surveillance strategies. These findings highlight the critical importance of including soft tissue examination and OPML screening as a standard component of dental assessments in patients with SMI. Given that patients with SMI may face cognitive, motivational, or logistical barriers to seeking specialized care, routine oral examinations may represent the only opportunity for early detection of potentially life-threatening lesions. Moreover, clinicians must remain vigilant, as many OPMLs are painless and can be easily overlooked in the absence of a systematic intraoral inspection. Integrating OPML screening into mental health services-ideally through interdisciplinary collaboration between dental and psychiatric care teams-can facilitate earlier diagnosis, reduce treatment delays, and potentially improve both survival and quality of life for individuals with SMI. Our findings advocate for policy-level changes to ensure routine mucosal evaluations are not omitted during dental check-ups in this vulnerable population.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, all assessments were based exclusively on clinical examination without adjunctive radiographic imaging. This approach may have underestimated the prevalence of root caries, periapical pathology, alveolar bone loss, and other conditions detectable only radiographically. Second, behavioral, pharmacological, and diagnostic variables-such as oral hygiene practices, dietary habits, tobacco and alcohol use, medication profiles, and psychiatric diagnosis subtypes-were not collected. These data are essential to fully understand the multifactorial determinants of oral health in this population and should be prioritized in future studies. Third, the relatively small sample size (n=60) and single-center design limit the statistical power and generalizability of the results to broader populations or healthcare settings. Finally, the cross-sectional nature of the study precludes causal inference and limits the ability to examine disease progression over time. Future multicenter longitudinal research incorporating radiographic evaluation, detailed behavioral assessments, and larger sample sizes is warranted to provide a more comprehensive understanding of oral health disparities in individuals with severe mental illness.

CONCLUSION

As a result, this study shows the significant oral health burden among individuals with SMI, with a mean OHAT score of 9.15 and a DMFT Index of 13.5, revealing widespread dental disease and hygiene deficiencies. Notably, the prevalence of decayed and missing teeth was high, while females had significantly more filled teeth. The identification of soft tissue lesions, including OPMD, further highlights the critical need for routine oral screening in psychiatric populations. Compared to non-psychiatric groups in the literature, patients with SMI exhibited severe oral health deterioration, often exceeding risk thresholds established in medically compromised or geriatric cohorts. These findings call for integrated, interdisciplinary care models with oral health services within mental health systems. Routine dental assessments, preventive care, and oral hygiene education should become standard components of psychiatric treatment pathways. Future research should focus on longitudinal designs, multicenter sampling, and the evaluation of targeted interventions to mitigate oral health disparities in this high-risk population.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the Kocaeli Health and Technology University Non-interventional Researches Ethics Committee (Date: 10.10.2024, Decision No: 2024-100).

Informed Consent

All participants (or their legal guardians, where necessary) provided informed consent prior to the examinations.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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