Nordic Psychology, 2022
https://doi.org/10.1080/19012276.2022.2093779

RESEARCH ARTICLE

Oral health and quality of life among people with severe or long-term mental illness: A call for interprofessional collaboration

J. BJØRKVIK[1], D. P. QUINTERO[2], K. H. M. JENSEN[1] & J. I. VIRTANEN[3,4]

Correspondence address: J. Bjørkvik, Oral Health Centre of Expertise in Western Norway, Bergen, Norway. Email: jofrid.bjorkvik@gmail.com

Abstract

People with severe or long-term mental illness (SMI) have poorer oral health than the general population has, but little is known about how, to what extent, and in what ways oral health problems affect daily functioning, quality of life and well-being among people in this patient group. The present study investigated oral health and oral health-related quality of life for persons with SMI in Norway. The longitudinal clinical study targeted SMI patients with their age- and gender-matched control patients at a public dental clinic in Norway. SMI patients were recruited from an ambulatory team within community mental health services. Clinical examinations followed the WHO criteria. We used a validated Oral Impact on Daily Performance (OIDP) instrument to assess oral health-related quality of life (OHRQoL). The prevalence of oral impact (OIDP $>$ 0) was 77% among SMI patients and 22% among the controls. More than 60% of the SMI patients reported difficulties showing their teeth without embarrassment, compared to 5.5% of the controls. The results suggest that shame is a key factor inhibiting patients faced with the need for dental treatment. Collaboration between dental and mental health professionals is therefore essential for this patient group to enjoy dignified oral health and quality of life.

KEYWORDS: severe or long-term mental illness, shame, oral health, oral health related quality of life, interprofessional collaboration

Introduction

Mental health problems are common and lead to a considerable burden of disease and years lived with disability (Alonso et al., 2013). While most conditions are mild and transient, the consequences of severe or long-term mental illness (SMI) is one of the leading causes of global disease burden (Vigo et al., 2016). Consequently, people with SMI are considered a vulnerable and marginalized group at high risk for additional social and health burdens (Brämberg et al., 2018; Hede et al., 2021; Vigo et al., 2016).

[1]Oral Health Centre of Expertise in Western Norway, Bergen, Norway
[2]Stord Public Dental Clinic, Vestland County Municipality, Norway
[3]Department of Clinical Dentistry, University of Bergen, Bergen, Norway
[4]Institute of Dentistry, University of Turku, Turku, Finland

Inequality in oral health has recently generated great and increasing international interest (Peres et al., 2019; Watt et al., 2019) and is considered a global public health challenge disproportionally affecting marginalized groups, such as people living with disabilities (Peres et al., 2019). Researchers therefore call for professional and political action in this field (Hede & Petersen, 1992; Peres et al., 2019; Slack-Smith et al., 2017; Watt et al., 2019).

People with SMI are known to have poorer oral health than the general population in Western countries (Kisely et al., 2011; De Hert, Correll et al., 2011; Hede & Petersen, 1992; Kisely et al., 2015; Slack-Smith et al., 2017). However, several questions related to understanding oral health and oral health care needs for people with SMI remain. For instance, little is known about how and to what extent oral health problems impact daily functioning, performance, and well-being among people in this patient group.

While oral health research has traditionally focused on oral diseases and medical conditions (Sischo & Broder, 2011), consensus to understand oral health as more, and something beyond, the mere absence of oral disease has been growing (World Health Organization, 2003). A paradigmatic shift has taken place towards a model of health that incorporates symptoms, physical functioning, and emotional and social well-being, and is recognizes quality of life (QoL) as an important outcome (Sischo & Broder, 2011; Watt et al., 2019; World Health Organization, 2003). The concept of QoL is a particularly important consideration for people with SMI, as their health condition is persistent and involves psycho-social aspects such as self-esteem and confidence (Alonso et al., 2013).

A relevant construct in this context is oral health-related quality of life (OHRQoL), which has allowed for a richer understanding of socio-dental indicators of health and well-being (Adulyanon & Sheiham, 1997; Chandu et al., 2016; Sischo & Broder, 2011). Inclusion of OHRQoL in oral research, oral service organization, and clinical practice is considered a substantial part of the paradigmatic shift towards patient-centered care (Sischo & Broder, 2011).

International studies have examined OHRQoL among persons with SMI (Haresaku et al., 2020; Patel & Gamboa, 2012). These studies (Haresaku et al., 2020; Patel & Gamboa, 2012) suggest that marginalized groups experience more severe oral health problems, including reduced OHRQoL, more often than does the general population. We are unaware of any study assessing the OHRQoL of people with SMI in Norway. The subject is important to investigate, as people with severe or long-term mental illness are, under certain conditions, entitled to free dental care and is regarded a prioritized group in the Norwegian Dental Health Act (Lov om tannhelsetjenesten § 1–3).

Dental health is known to have improved significantly among adults in Norway in recent decades (Skudutyte-Rysstad & Eriksen, 2007), and their OHRQoL is considered good (Åstrøm et al., 2005). However, most studies of OHRQoL in Norway have examined the general population (Dahl et al., 2011; Gülcan et al., 2014), with the recent exception of a study examining the prevalence of OHRQoL and its distribution according to social, behavioral, and clinical covariates among patients suffering substance use disorders and receiving medically assisted rehabilitation (MAR) in western Norway (Åstrøm et al., 2021).

Norwegian authorities emphasize egalitarian principles and have declared a clear objective to prioritize vulnerable patient groups and ensure equal health services. However, current oral health services fail to adequately meet the needs of patients with SMI and frequently encounter numerous barriers (Bjørkvik et al., 2021). Further, international research suggests that mental health care providers neglect the importance of oral health as a natural and

important part of general health (Kisely, 2016; Kisely et al., 2011). That is, mental health care providers neglect patients' oral health, and dental health providers neglect patients' subjective and psychosocial challenges (De Hert, Cohen et al., 2011). Thus, a deeper understanding and appreciation of patients' own subjective experience of oral health and the challenges that oral problems create in their everyday lives is urgently needed. Patient-centered knowledge will provide valuable information for decision-making and planning of health care services for vulnerable groups such as people with SMI (Sischo & Broder, 2011).

The present study aimed to investigate OHRQoL, oral health, oral health behavior and dental attendance among persons with SMI in a public dental clinic in western Norway. Specifically, we investigated associations between this patient group and the general adult population. Further, we evaluated the prevalence of oral impact in SMI patients and a group of control patients.

Material and methods

Design and sample

This study is part of a longitudinal project examining oral health and dental treatment for persons with severe or long-term mental illness (Bjørkvik et al., 2021). The research project has been implemented as part of ordinary clinical practice in a public dental clinic in western Norway. The Regional Committee for Medical Research Ethics approved the study (Reg no 2015/1724-1). Participation in the study was voluntary, and the patients were informed that they could receive dental treatment regardless of whether they participated in the study. All participants provided their written informed consent to participate prior to inclusion.

The Oral Health Centre of Expertise in western Norway initiated and conducted the study in collaboration with the public dental clinic and an ambulatory team within the community mental health services in a Norwegian municipality with a population of 18 000 inhabitants. This team is part of the community home nursing services and provides services to people who need support in everyday life due to mental health challenges. Offers of support from the ambulatory team are provided after assessment of needs, regardless of psychiatric diagnosis. In line with this, the term SMI in this study refers to mental health problems that negatively affect the functioning of daily life over time, and which entail a need for support from the home nursing mental health team. As a weekly service-user for three months or more, one is entitled the right to free dental care. All service-users in the ambulatory team at the outset of the study ($n = 82$) were invited to participate. Receiving services from the team was the only inclusion criteria, and there were no exclusion criteria. Of these, 51 persons (62%) agreed to participate. Interviews, and oral examinations for the patients were performed between September 2016 and June 2018.

Participants received oral and written information about the study from their contact person (psychiatric nurses) in the mental health team and were invited to participate. The same nurses received consent from those who wanted to participate. One nurse, in collaboration with the research group, organized appointments that were communicated to the participants. They were then asked if they needed adapted transport and/or support from the psychiatric nurse on arrival to the dental clinic.

Table 1. Description of the participating SMI-patients and their controls.

	SMI-patients		Control patients	
	n	%	n	%
Total sample	51	—	55	—
Marital status				
Married/living together	19	37.3	49	89.1
Single/living alone	32	62.7	6	10.9
Education				
Primary school (9 years)	17	33.3	4	7.3
Secondary school (12 years)	28	54.9	28	50.9
University (15 years+)	6	11.8	23	41.8
Occupation				
Working > 50%	0	—	50	90.9
Working part time, max 30%	3	5.9	0	—
Sick leave	17	25	3	5.5
Disability pension, age pension	29	42.6	2	3.6
Sheltered occupation	3	4.4	0	—
Other (social benefits, unemployment,benefits)	3	2	0	—
Diagnostic categoriy				
Anxiety disorders	36	70.6		
Mood disorders	34	66.7		
Psychosis inkl bipolar disorder	16	31.4		
Cognitive disabilities	15	29.4		
Somatic illness	24	47.1	22	40.0
Duration of mental illness				
< 5 years	3	5.9		
6-10 years	5	9.5		
> 10 years	42	82.4		

Participation in the study involved an intake interview by the first author (JB), a clinical dental examination by the second author (DQ), and questionnaires on issues relevant to oral health. After identifying the patients' treatment needs in the oral examination, the dentists provided dental treatment to all patients while taking into account the patients' own preferences.

This study targeted a population with SMI and an age- and gender-matched control group comprising ordinary consecutive patients regularly visiting the same dental clinic. Table 1 shows the study population and their controls according to psychiatric diagnosis and duration of mental disorder by age and gender. The Mini International Neuropsychiatric Interview (M.I.N.I) Norwegian Translation Version 6.0.0. (Lecrubier et al., 2009) served to define the psychiatric diagnostic categories, and was conducted as part of the intake interview.

Outcome measures

Oral examinations

A single dentist (DQ), previously calibrated to a single gold standard examiner, conducted the study, which included clinical and radiological examination that adhered to standard WHO criteria (World Health Organization, 2013). The clinical examination included DMFT (decay, missing, filled teeth) indices, including measurement of caries experience and summation of all teeth that are filled, carious or extracted due to caries. To record oral status, we calculated the oral hygiene index as the sum of the Debris Index and the Calculus index.

Questionnaires

The questionnaire consisted of three parts: oral health habits, oral health-related quality of life, and self-experienced dry mouth (xerostomia). All participants were asked to provide information on their oral health habits: toothbrushing (never, 1–3 times a week, 4–7 times a week, twice a day), use of dental floss (never, 1–3 times a week, 4–7 times a week, twice a day), use of mouthwash (never, 1–3 times a week, 4–7 times a week, twice a day), and current smoking (yes/no). For the analysis, we dichotomized the oral health habits items to less than twice a day and twice a day.

The eight-item Oral Impact on Daily Performance (OIDP) frequency inventory (Adulyanon et al., 1996) served to assess oral health-related quality of life. The form is widely used internationally and has been the subject of Norwegian validation (Åstrøm et al., 2005). "During the past six months, how often have problems with your mouth and teeth caused you any difficulty with: eating and enjoying food, speaking and pronouncing clearly, cleaning your teeth, sleeping and relaxing; smiling and showing your teeth without embarrassment, maintaining your usual emotional state, enjoying contact with people and carrying out major work?" Respondents scored each item on a five-point Likert scale: (1) never affected, (2) less than once a month, (3) once or twice a month, (4) once or twice a week, (5) every/nearly every day. Before conducting any analyses, we rescaled the scores in the questionnaire so that for each question, the highest score for a person with the largest OIDP problems was four (4), and 0 for a person with no OIDP problems.

An eight-question form based on the "Xerostomia Inventory" (Haugbo et al., 2010) served to assess self-experienced dry mouth (xerostomia). The questions inquired about eight aspects of experiencing dry mouth, asking participants to state whether they experienced this problem (yes/no). "Do you feel dryness in the mouth at any time? Does your mouth usually feel dry? Do you have to do something to relieve dry mouth? Do you get up at night to drink? Do you have difficulties speaking because of dryness in the mouth? Do you sip liquids to aid swallowing food? Does your mouth feel dry when eating a meal? Do you have difficulties swallowing certain foods?

For the analysis, we measured each answer from the OIDP questionnaires as a binary variable with the values zero (0) and one (1) for unconfirmed and confirmed items, respectively. For both the OIDP and xerostomia questionnaires, we summarized the binary variables by assigning scores ranging from zero (0) to eight (8) for the number of confirmed items for each person. We called these variables *OIDP.score* and *Xerostomia.score*, depending on the questionnaire they represent. We also created a binary measure of these scores: individuals

with no confirmed items from the given questionnaire were scored zero (0), and individuals with any item (i.e., score $>$ 0) were scored one (1). We called these measures *binary.OIDP.score* and *binary.Xerostomia.score*, respectively.

Dental attendance

We registered previous attendance by noting the individual's last visit to the dental clinic. Further, we recorded the number of sessions needed to complete the treatment and whether the patient needed supported transport and support from a psychiatric nurse to visit the clinic.

Analysis and statistical methods

We used the statistical software R, version 4.1.1 for the statistical analyses and plots (R Development Core Team, 2021). To explore group differences in demographic variables, dental hygiene behavior and oral status, we used Chi-square tests to investigate differences in categorical variables and the Mann-Whitney test to investigate differences in ordinal variables between SMI patients and controls.

We used a binary logistic model served to compare the proportion of SMI patients with any OIDP issue (*binary.OIDP.score)* to controls. We used the following R syntax: *glm(binary.OIDP.score* $\sim$ *Group, family* $=$ *binomial, data* $=$ *oidp.df),*where *glm* is a function used to perform generalized linear models, *binary.OIDP.score* is the response variable as described above, *Group* (SMI patients or controls) is the predictor variable, *family* $=$ *binomial* defines the model family (distribution of the response variable) and *oidp.df* identifies which dataset was used in the model.

To determine the type(s) of OIDP issue(s) in which SMI patients and control patients differed, we performed the same type of analysis for each question in the questionnaire using the binary OIDP score of the given question as response variable. Four SMI patients failed to answer the questions related to OIDP and were therefore excluded from any analyses related to OIDP. Thus, the total sample size for OIDP analyses comprised 46 SMI patients and 55 controls.

We performed the same two steps in the analysis of xerostomia and used the same binary logistic modelling as described for OIDP. Thus, we first compared the overall difference in the binary.Xerostimia.score and then used the same model within each question in the questionnaire to obtain an overview of which xerostomia problems differed most between SMI patients and controls. Two SMI patients failed to answer the questions related to xerostomia and were therefore excluded from any analyses related to xerostomia. Thus, the total sample size for the xerostomia analyses comprised 48 SMI patients and 55 control patients. The STROBE checklist was used in the reporting of the study.

Results

Table 2 shows the oral status of SMI and control patients. Table 3 shows oral hygiene behavior, smoking and dental attendance. We found statistically significant differences between SMI patients and controls in tooth decay, missing teeth due to caries, oral hygiene

Table 2. Oral status of the SMI patients and the controls.

	SMI-patients (n = 50)		Controls (n = 55)		P value
	Range	Mean(SD)	Range	Mean(SD)	
DMFT	5–32	18.3(6.7)	0–28	16.07(6.7)	0.09
Decay	0–13	2,66(3,5)	0–9	1.47(1.9)	0.03
Filled with decay	0–15	4,6(4,0)	0–16	4.40(3.5)	0.8
Missing due to caries	0–28	2,98(5,2)	0–8	0.78(1.8)	0.004
Missing any other reason	0–5	0,66(1,3)	0–5	0.95(1.5)	0.3
Filled	0–23	7,46(4,9)	0–26	8.47(5.5)	0.3
Oral hygiene lindex debris	0–3,00	0,82(0,7)	0–2,5	0.43(0.5)	0.001
Oral hygiene Index calculum	0–1,10	0,35(0,3)	0–,8	0.24(0.2)	0.03
Medication					
Number of used medications	0–4	1.9(1,1)	0–4	0.6(1.0)	0.001

Table 3. Oral hygiene behavior and dental attendance.

	SMI-patients (n = 50)	Controls (n = 55)	P value
Tooth brushing twice a day (n, %)	24(48)	51(92.7)	0.001
Current daily smoking (n, %)	22(44)	9(14.5)	0.001
Dental attendance			
Last visit < 2 years (n, %)	37(74)	51(92.7)	0.001
In need of supported transport (n, %)	22(44)	0	—
In need of support from nurse (n, %)	19(38)	0	—
Treatment completed (n, %)	42(84)	55(100)	—
Number of sessions (Range, M(SD))	1–13, 4.18(2.6)	1–51.87(1.09)	0.001

index debris, oral hygiene index calculum, number of medications on a daily basis, tooth brushing, smoking and dental visits.

The analysis comparing the group-dependent proportion of those with any OIDP issue showed a clear difference, with a higher proportion among SMI patients than among control individuals (binary logistic regression, Deviance = 32.196, Residual df = 100, Residual deviance = 108.85, $p < 0.001$, Figure 1). The mean OIDP score came to 3.57 (SD = 3.06) among SMI patients and 0.42 (SD = 1.15) among controls (range 0–8). The analysis evaluating the type of OIDP that differed between SMI patients and controls revealed that all eight OIDP issues evaluated in this study had a significant higher occurrence in SMI patients than among control patients (Figure 2).

The results were similar for xerostomia: The analysis comparing the group-dependent proportion of those with any xerostomia issue showed a clear difference, with SMI patients having a higher proportion than control individuals (binary logistic regression, Deviance = 14.759, Residual df = 102, Residual deviance = 128.80, $p < 0.001$, Figure 3). The mean

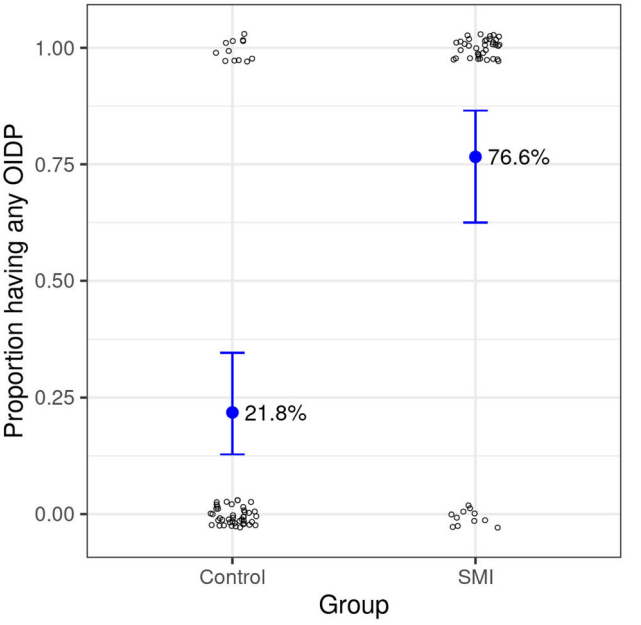

Figure 1. Proportion and corresponding 95% confidence intervals having any oral impact on daily performance (OIDP) among SMI patients and controls. The small data points at 0 and 1 represent raw data where some random displacement of data points has been added to better illustrate the number of individuals in each category.

xerostomia score came to 3.18 (SD = 2.61) among SMI patients and 0.8 (SD = 1.37) among controls (range 0–8). The analysis evaluating the type of xerostomia that differed between SMI patients and controls revealed that all eight xerostomia issues evaluated in this study occurred significantly more in SMI patients than in control patients (Figure 4).

Discussion

This study provides new information on oral health for people with severe or long-term mental illness (SMI), and especially on how oral problems impact daily functioning and quality of life. As part of ordinary clinical practice in a public dental health service, we examined oral health-related quality of life (OHRQoL) measured using OIDP, xerostomia, oral status, dental hygiene habits and dental attendance among persons with SMI compared to subsequent adult patients visiting the same dental clinic for routine check-ups.

Traditional measures of oral status (DMFT) showed differences between SMI and control patients, with significant differences occurring only in the caries and missing teeth subcategories. However, differences between the two groups in the subjective measures that comprise OIDP and xerostomia were far more marked. Our findings indicate that dental and oral conditions impact daily functioning for SMI patients more than for the general population. This finding is alarming and indicates additional burdens for people who already have serious life restrictions due to mental illness. That is, persons with SMI suffer lower quality of life due to problems with their teeth and mouth, resulting in unattained targets for

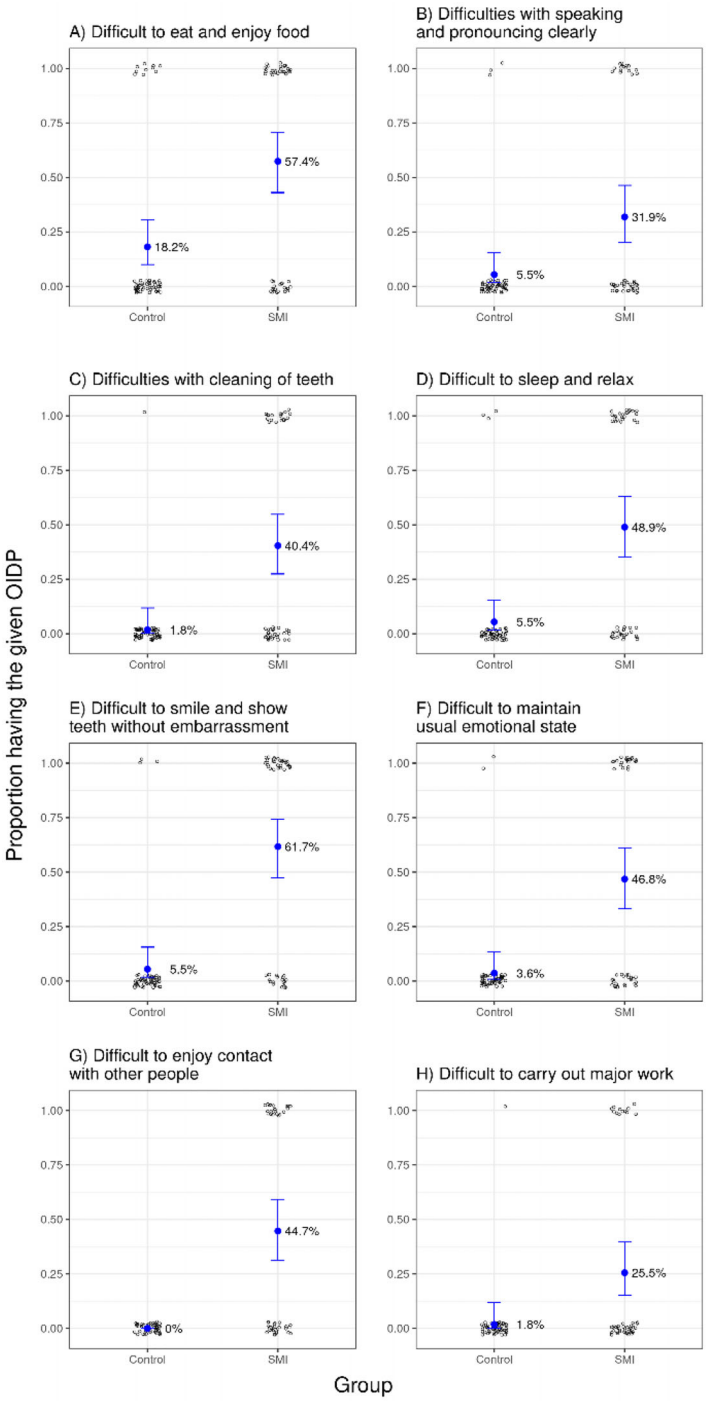

Figure 2. Proportion having the given OIDP issue for control individuals and patients having severe mental illness (SMI). For all eight OIDP issues evaluated, there is a statistically significant increase in the probability of having the given issue for patients with severe mental illness compared to individuals in the control group.

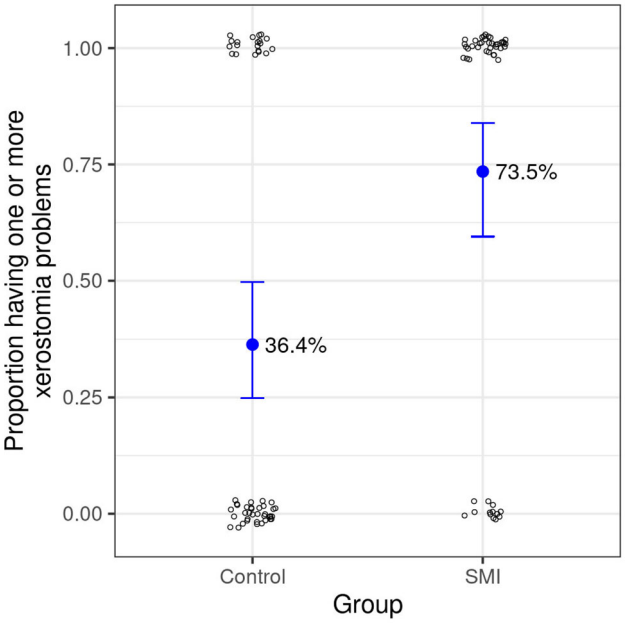

Figure 3. Proportion and corresponding 95% confidence intervals having any xerostomia problem among SMI patients and controls.

equality in health. Differences in SMI patients' backgrounds, such as education, occupation, smoking, and oral hygiene behavior (toothbrushing), underscores the fact that this is a vulnerable patient group in need of special attention.

This study focused on OHRQoL. To understand the severity, content, and significance of the results, it is relevant to compare the results of this study to those of similar studies and to examine certain items in greater detail. Of the SMI patients, 77% reported at least one oral impact on daily performance. Interestingly, this is a higher proportion than among Norwegian MAR patients (61%) (Åstrøm et al., 2021). Among the controls, 22% reported at least one oral impact on daily performance, which is in line with Norwegian average values (18%) (Åstrøm et al., 2005). The mean OIDP score among the SMI patients came to 3.57 (SD = 3.06), indicating a reduction in nearly half of eight total performances. The corresponding number among MAR patients was 2.0 (SD = 2.4) (Åstrøm et al., 2021). Again, reports among our control patients were in line with Norwegian norm values (OIDP score 0.4, SD = 1.1) (Åstrøm et al., 2005).

All eight domains of functioning in OIDP showed significant differences. Two domains stood out because they included more than half of the SMI participants: 53% of them reported discomfort when eating due to oral health problems compared to 18% of controls. Further, 62% of participants with SMI reported that oral health problems caused difficulties in smiling and showing their teeth without embarrassment, compared to 5.5% of the controls. Oral conditions are known to reduce social and interpersonal life and likely life satisfaction (Peres et al., 2019). An urge to hide one's mouth and teeth is usually understood as an expression of shame (Gilbert et al., 1994). Thus, confirmation of this test item indicates a sense of inferiority and not being good enough that it will impact the person's interaction with fellow citizens

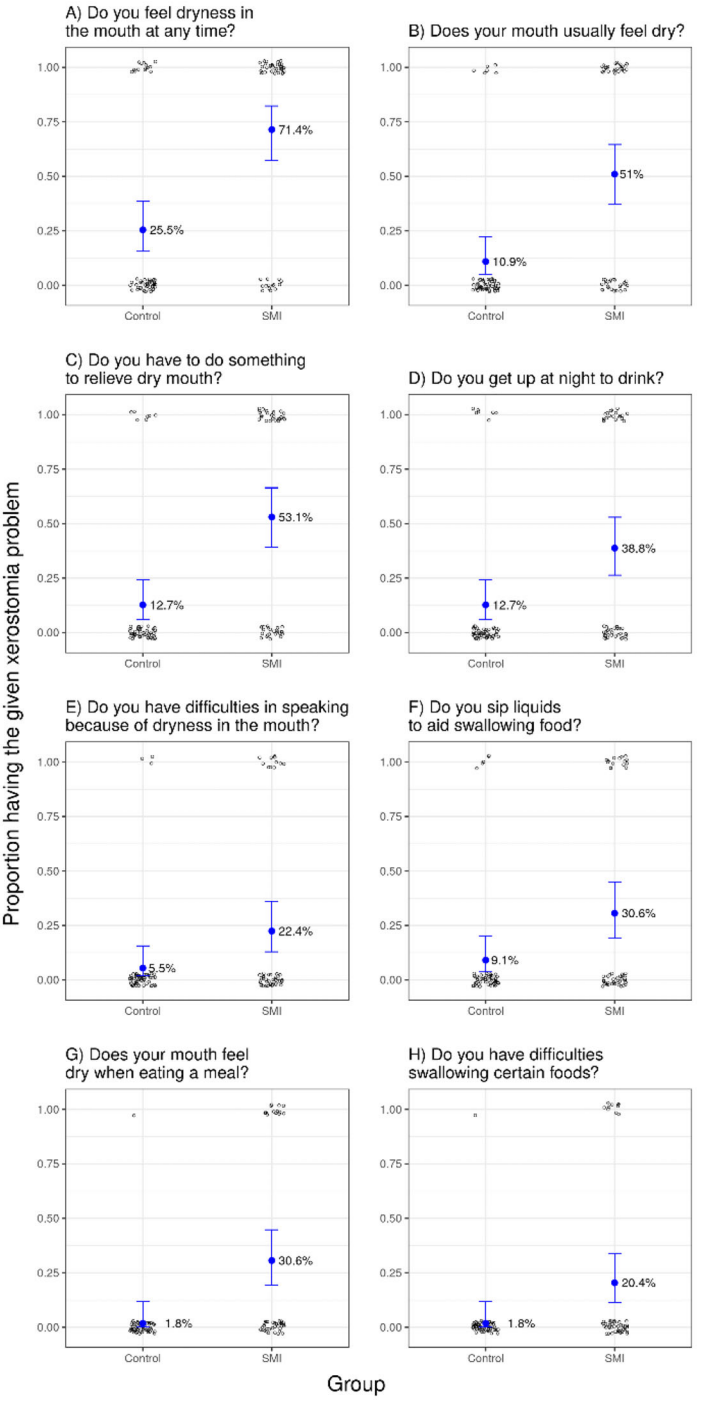

Figure 4. Proportion having the given xerostomia issue for control individuals and patients having severe mental illness (SMI). For all eight xerostomia issues evaluated, there is a statistically significant increase in the probability of having the given issue for patients with severe mental illness compared to individuals in the control group.

(Gilbert et al., 1994). Equally important, shame will also impact the person's interaction with the dentist, with direct implications for dental care. Shame has behavioral consequences.

Shame is often accompanied by self-stigmatization (Corrigan et al., 2009) and correlates negatively with adherence to treatment (Livingston & Boyd, 2010). Thus, meeting and mitigating shame in patients with SMI should be an important concern for dental health professionals. To do this, health professionals and service planners must see the patient as a full human being, not just be concerned with their teeth (Torper et al., 2019). Abrahamsson et al. (2002) stated that cultivating a respectful relationship with the patient is crucial when interacting with vulnerable patient groups. SMI patients ask for dental health services that provide continuity and predictability, enabling them to meet professionals with expertise and interest in the field and who can become familiar with the patient over time (Bjørkvik et al., 2021).

GPs and psychiatrists should address the high occurrence of xerostomia among SMI patients, as xerostomia is a known side-effect of medication with increasing risk for oral disease (Millsop et al., 2017). Further, xerostomia impacts daily functioning and thus associates with poor OHRQoL (Niklander et al., 2017).

It is important to note that the most extensive health problems that emerged in this study cannot be identified on X-rays or in a dentist's oral examinations alone. Trustful communication between the patient and the dentist is the only way. Our findings highlight the importance of including subjective measures in dental clinical practice. Equally important, the dental health team needs knowledge, competence, and guidance on how to recognize and meet the individual needs of patients with SMI, as well as how to establish a trustful relationship while facilitating dental treatment. Almost half of the SMI patients requested supported transport, and more than one-third asked for support from the psychiatric nurse on arrival to the dental visit. Further, the SMI patients needed nearly four times as many sessions as control patients - differences that are not explained by treatment needs. Thus, our results show that SMI patients require more time, support and practical facilitation to complete dental treatment. Such measures are unavailable in ordinary practice in dental clinics. Further, SMI patients' psychosocial needs are seldom known in the dental clinic.

Watt et al. (2019) identify an urgent need for system reform in dentistry, from isolation and separation from the mainstream health care system to full integration with primary care services. In line with this, a recent study (Mishu et al., 2022) conclude that a stronger integration of dental and mental health services is needed to provide tailored support for overall health and well-being, including the oral health of the person (Mishu et al., 2022). Further, according to Watt et al. (2019), oral health care systems need to be more inclusive, accessible, and accommodating to vulnerable groups, with a stronger focus on promoting and maintaining oral health. These suggestions are in accordance with the Norwegian Dental Health Act, which state that dental health services shall be outreach and regular, and that preventive measures shall be prioritized before treatment. Our results recommend stronger and further developed collaboration, as preventive measures require strong cooperation with mental health services and with persons whom the patients know and trust. Mental health care services and providers must therefore recognize oral health as a natural and important part of general health with a significant impact on quality of life.

Our study has certain limitations. The sample is however relatively small and from a single Norwegian municipality. On the other hand, one calibrated dentist (DQ) examined a comprehensive set of measures and indicators, adding to the study's reliability. Further, its naturalistic design provides limited control for the selection of participants and diagnostic methods. Semi-standardized interviews served in the diagnostic process, but only to identify the main diagnostic categories. However, possible diagnostical differences were not the subject of this study, as most patients reported long-term and complex mental and psychosocial challenges, and the general level of functioning was low. The naturalistic design may also be considered a strength, however, as it contributes to the studý s external, or ecological, validity. This also relates to the fact that the data came from a cohort of service-users in community mental health services, and that all service-users were invited to participate in the study regardless of diagnosis or oral health issues. This may have strengthened the representativeness of the sample also. The results exhibited marked floor effects as most control patients reported oral impact and xerostomia close to zero. These floor effects reflect oral health status of participants and are in line with the healthy profile of Norwegian adults (Åstrøm et al., 2005; Skudutyte-Rysstad & Eriksen, 2007). However, the results exhibit sufficient discriminative properties to detect differences between the target group (people with SMI) and the control patients.

Conclusion

Oral health problems significantly impact daily functioning for persons with SMI and contribute to reduced quality of life. Inequalities in oral health and OHRQoL measured using OIDP between people with SMI and the general population carry significant implications for dental and mental health care providers, as well as political significance. Collaboration with, and efforts from, mental health care is essential to provide dignified oral health and quality of life for this patient group.

Acknowledgement

The authors would like to acknowledge Norwegian Health Authority for financial support for the subject. We also acknowledge Ileana Mihaela Cudia Marthinussen and Elwalid Nasir for contribution in the calibration process.

Disclosure statement

The authors have no conflicts to declare.

ORCID

J. Bjørkvik http://orcid.org/0000-0002-0270-3856
J. I. Virtanen http://orcid.org/0000-0001-6574-9942

REFERENCES

Adulyanon, S., & Sheiham, A. (1997). Oral Impacts of Daily Performances. In G. D. Slade (Ed.), *Measuring Oral Health and Quality of Life* (pp. 151–160). University of North Carolina, Dental Ecology.

Adulyanon, S., Vourapukjaru, J., & Sheiham, A. (1996). Oral impacts affecting daily performance in a low dental disease Thai population. *Community Dentistry and Oral Epidemiology*, *24*(6), 385–389. https://doi.org/10.1111/j.1600-0528.1996.tb00884.x

Alonso, J., Chatterji, S., & He, Y. (2013). *The burdens of mental disorders: From the WHO World Mental Health Services*. Cambridge University Press.

Åstrøm, A. N., Haugejorden, O., Skaret, E., Trovik, T. A., & Klock, K. S. (2005). Oral impacts on daily performance in Norwegian adults: Validity, reliability and prevalence estimates. *European Journal of Oral Sciences*, *113*(4), 289–296. https://doi.org/10.1111/j.1600-0722.2005.00225.x

Åstrøm, A. N., Virtanen, J., Özkaya, F., & Fadnes, L. T. (2021). Oral health related quality of life and reasons for non-dental attendance among patients with substance use disorders in withdrawal rehabilitation. *Clinical and Experimental Dental Research*, *8*(1), 68–68. https://doi.org/10.1002/cre2.476

Bjørkvik, J., Quintero, D. P. H., Vika, M. E., Nielsen, G. H., & Virtanen, J. I. (2021). Barriers and facilitators for dental care among patients with severe or long-term mental illness. *Scandinavian Journal of Caring Sciences*, *36*(1), 27–29. https://doi.org/10.1111/scs.12960

Brämberg, E. B., Torgerson, J., Kjellström, A. N., Welin, P., & Rusner, M. (2018). Access to primary and specialized somatic health care for persons with severe mental illness: a qualitative study of perceived barriers and facilitators in Swedish health care. *BMC Family Practice*, *19*(1), 12. https://doi.org/10.1186/s12875-017-0687-0

Chandu, V., Pachava, S., Vadapalli, V., Ravoori, S., Nizampatnam, P., & Kothia, N. (2016). How important is oral health in determining quality of life: A narrative review. *International Journal of Medical Reviews*, *3*(3), 476–481. https://doi.org/10.15171/ijmr.2016.04

Corrigan, P. W., Larson, J. E., & Rüsch, N. (2009). Self-stigma and the «why try» effect: Impact on life goals and evidence-based-practices. *World Psychiatry*, *8*(2), 75–81. https://doi.org/10.1002/j.2051-5545.2009.tb00218.x

Dahl, K. E., Wang, N. J., Skau, I., & Öhrn, K. (2011). Oral health-related quality of life and associated factors in Norwegian adults. *Acta Odontologica Scandinavica*, *69*(4), 208–214. https://doi.org/10.3109/00016357.2010.549502

De Hert, M., Cohen, D., Bobes, J., Cetkovich-Bakmas, M., Leucht, S., Ndetei, D. M., Newcomer, J. W., Uwakwe, R., Asai, I., Möller, H.-J., Gautam, S., Detraux, J., & Correll, C. U. (2011). Physical illness in patients with severe mental disorders. II. Barriers to care, monitoring and treatment guidelines, plus recommendations at the system and individual level. *World Psychiatry*, *10*(1), 138–151. https://doi.org/10.1002/j.2051-5545.2011.tb00036.x.

De Hert, M., Correll, C. U., Bobes, J., Cetkovich-Bakmas, M., Cohen, D., Asai, I., Detraux, J., Gautam, S., Möller, H.-J., Ndetei, D. M., Newcomer, J. W., Uwakwe, R., & Leucht, S. (2011). Physical illness in patients with severe mental disorders. I. Prevalence, impact of medications and disparities in health care. *World Psychiatry*, *10*(1), 52–77. https://doi.org/10.1002/j.2051-5545.2011.tb00014.x

Gilbert, P., Pehl, J., & Allan, S. (1994). The phenomenology of shame and guilt: An empirical investigation. *British Journal of Medical Psychology*, *67*(1), 23–36. https://doi.org/10.1111/j.2044-8341.1994.tb01768.x

Gülcan, F., Nasir, E., Ekbäck, G., Ordell, S., Lie, S. A., & Åstrøm, A. N. (2014). Change in oral impacts on daily performances (OIDP) with increasing age: Testing the evaluative properties of the OIDP frequency inventory using prospective data from Norway and Sweden. *BMC Oral Health*, *14*, 59. http://www.biomedcentral.com/1472-6831/14/59 https://doi.org/10.1186/1472-6831-14-59

Haresaku, S., Nakashima, F., Hara, Y., Kuroki, M., Aoki, H., Kubota, K., & Naito, T. (2020). Associations of Oral Health-Related Quality of Life with age, oral status, and oral functioning among psychiatric inpatients in Japan: A cross-sectional study. *BMC Oral Health*, *20*(1), 361. https://doi.org/10.1186/s12903-020-01355-5

Haugbo, H., Storhaug, F. K., & Willumsen, T. (2010). Rusavhengighet, psykiatri og oral helse. Rapport fra et sykehusprosjekt i Oslo. [Drug dependency, psychiatry and oral health. Report from a hospital project in Oslo, Norway]. *Norske Tannlegeforening Tidende*, *120*, 912–917.

Hede, B., de Palma, P., Persson, K., & Lahti, S. (2021). Oral sundhed hos marginaliserede borgere. [Oral health in the margins of the community]. *Norske Tannlegeforen Tidende*, *131*, 116–122.

Hede, B., & Petersen, P. E. (1992). Self-assessment of dental health among Danish noninstitutionalized psychiatric patients. *Special Care in dentistry*, *12*(1), 33–36. https://doi.org/10.1111/j.1754-4505.1992.tb00405.x

Kisely, S. (2016). No mental health without oral health. *Canadian Journal of psychiatry. Revue canadienne de psychiatrie*, *61*(5), 277–282. https://doi.org/10.1177/0706743716632523

Kisely, S., Baghaie, H., Lalloo, R., Siskind, D., & Johnson, N. W. (2015). A systematic review and meta-analysis of the association between poor oral health and severe mental illness. *Psychosomatic Medicine*, *77*(1), 83–92. https://doi.org/10.1097/PSY.0000000000000135

Kisely, S., Lake-Hui, Q., Pais, J., Lalloo, R., Johnson, N. W., & Lawrence, D. (2011). Advanced dental disease in people with severe mental illness: A systematic review and meta-analysis. *The British Journal of Psychiatry*, *199*(3), 187–193. 10.1192/bjp.bp.110.081695

Lecrubier, Y., Weiller, E., Hergueta, T., Allgulander, C., Kadri, N., Baldwin, D., Even, C. (2009). M.I.N.I. *Mini internasjonalt Nevropsykiatrisk Intervju 6.0.0* (January 1, 2009) M.I.N.I - Norwegian translation. https://www.helsebiblioteket.no/psykisk-helse/skaringsverktoy/m.i.n.i.mini-internasjonalt-nevropsykiatrisk-intervju

Livingston, J. D., & Boyd, J. E. (2010). Correlates and consequences of internalized stigma for people living with mental illness: A systematic review and meta-analysis. *Social Science & Medicine*, *71*(12), 2150–2161. https://doi.org/10.1016/j.socscimed.2010.09.030

LOV-1983-06-03-54. Lov om tannhelsetjenesten. [Norwegian Dental HealthAct]. https://www.lovdata.no/NL/lov/1983-06-03-54/

Millsop, J. W., Wang, E. A., & Fazel, N. (2017). Etiology, evaluation and management of xerostomia. *Clinics in Dermatology*, *35*(5), 468–476. https://doi.org/10.1016/j.clindermatol.2017.06.010

Mishu, M. P., Faisal, M. R., Macnamara, A., Sabbah, W., Peckham, E., Newbronner, L., Gilbody, S., & Gega, L. (2022). A qualitative study exploring the barriers and facilitators for maintaining oral health and using dental services in people with severe mental illness: Perspectives from service users and service providers. *International Journal of Environmental Research and Public Health*, *19*(7), 4344. https://doi.org/10.3390/ijerph19074344

Niklander, S., Veas, L., Barrera, C., Fuentes, F., Chiappini, G., & Marshall, M. (2017). Risk factors, hyposalivation and impact of xerostomia on oral health-related quality of life. *Brazilian Oral Research*, *31*. https://doi.org/10.1590/1807-3107bor-2017.vol31.0014

Patel, R., & Gamboa, A. (2012). Prevalence of oral diseases and oral-health-related quality of life in people with severe mental illness undertaking community-based psychiatric care. *British Dental Journal*, *213*(9), E16. https://doi.org/10.1038/sj.bdj.2012.989

Peres, M. A., Macpherson, L. M. D., Weyant, R. J., Daly, B., Venturelli, R., Mathur, M., List, l S., Celeste, R. K., Guarnizo-Herreno, C. C., Kearns, C., Benzian, H., Allison, P., & Watt, R. G. (2019). Oral diseases: A global public health challenge. *Lancet*, *394*(10194), 249–260. https://doi.org/10.1016/S0140-6736(19)31146-8

R Development Core Team (2021). *R: A language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing.

Sischo, L., & Broder, H. L. (2011). Oral health-related quality of life: What, why, how, and future implications. *Journal of dental research*, *90*(11), 1264–1270. 10.1177/0022034511399918.

Skudutyte-Rysstad, R., & Eriksen, H. (2007). Changes in caries experience among 35-year-old Oslo citizens, 1973-2003. *Acta Odontologica Scandinavica*, *65*(2), 72–77. https://doi.org/10.1080/00016350601048003

Slack-Smith, L., Hearn, L., Scrine, C., & Durey, A. (2017). Barriers and enablers for oral health care for people affected by mental health disorders. *Australian Dental Journal*, *62*(1), 6–13. https://doi.org/10.1111/adj.12429

Torper, J., Ansteinsson, V., & Lundeby, T. (2019). Moving the four habits model into dentistry. Development of a dental consultation model: Do dentists need an additional habit? *European Journal of Dental Education*, *23*(2), 220–229. https://doi.org/10.1111/eje.12421

Vigo, D., Thornicroft, G., & Atun, R. (2016). Estimating the true global burden of mental illness. *The Lancet. Psychiatry*, *3*(2), 171–178. https://doi.org/10.1016/S2215-0366(15)00505-2

Watt, R. G., Daly, B., Allison, P., Macpherson, L. M. D., Venturelli, R., Listl, S., Weyant, R. J., Mathur, M. R., Guarnizo-Herreno, C. C., Celeste, R. K., Peres, M. A., Kearns, C., & Benzian, H. (2019). Ending the neglect of global oral health: Time for radical action. *Lancet (London, England)*, *394*(10194), 261–272. https://doi.org/10.1016/S0140-6736(19)31133-X

World Health Organization. (2003). *The World oral Health Report 2003: continuous improvement of oral health in the 21st century – the approach of the WHO Global Oral Health Programme*. World Health Organisation. 10.1046/j..2003.com122.x.

World Health Organization. (2013). *Oral health surveys: basic methods* (5th ed.). WHO.