

[DOI]10.12016/j.issn.2096-1456.2023.11.004

• 临床研究 •

20~30岁凸面型青年人笑容暴露量及其相关因素分析

祝丽青, 陈贞瑀, 黄云, 高姗姗

口腔疾病研究国家重点实验室 国家口腔疾病临床医学研究中心 四川大学华西口腔医院修复科, 四川 成都 (610041)

【摘要】目的 探讨20~30岁凸面型青年人的笑容暴露量并分析其与面部美学指标、笑容满意程度之间的联系。**方法** 本研究获得医院伦理审批,受试者知情同意及肖像授权。招募80名20~30岁的凸面型青年受试者,录制姿势位微笑和自发性大笑时的全过程并导入Photoshop CC软件,选取关键帧,测量笑容暴露量。通过三维面扫获取受试者静息状态下的面部三维信息,测量面下1/3相关美学指标,评估受试者对自身笑容的满意程度,并对不同性别笑容暴露量与面下1/3相关美学指标、心理评分进行相关性分析。**结果** 20~30岁不同性别间的笑容暴露量、笑容模式、面下1/3相关美学指标数据和主观心理测评评分均有统计学差异($P < 0.05$)。大笑时男、女间的开口度差距大,男性的平均开口度为女性的5倍,而男性的平均上颌中切牙牙龈暴露高度约为女性的1/2。男性的平均鼻唇角($99.80^\circ \pm 7.96^\circ$)大于女性($96.26^\circ \pm 7.31^\circ$)($P < 0.05$),而男性的平均上唇长度占面下1/3长度比例($33.73\% \pm 2.35\%$)小于女性($38.57\% \pm 2.76\%$)($P < 0.05$)。男性的平均心理评分(57.75 ± 13.46)高于女性(53.69 ± 17.95)($P < 0.05$)。微笑及大笑时的上颌软组织暴露量占口裂面积比例与鼻唇角呈正相关,大笑时口裂宽度与心理评分呈负相关。**结论** 20~30岁凸面型男、女性的笑容暴露量和笑容模式不同,男性笑容开口度大,牙龈暴露量少,女性笑容开口度小,牙龈暴露量多。笑容暴露量与鼻唇角呈正相关,与笑容满意程度呈负相关。

【关键词】 青年人; 微笑; 大笑; 暴露量; 三维图像; 鼻唇角; 心理测评; 美学指标; 牙龈暴露高度; 口腔美学修复

【中图分类号】 R78 **【文献标志码】** A **【文章编号】** 2096-1456(2023)11-0786-08

【引用著录格式】 祝丽青, 陈贞瑀, 黄云, 等. 20~30岁凸面型青年人笑容暴露量及其相关因素分析[J]. 口腔疾病防治, 2023, 31(11): 786-793. doi:10.12016/j.issn.2096-1456.2023.11.004.

Analysis of smile exposure and related factors in young people aged 20 to 30 with convex facial profiles
ZHU Liqing, CHEN Zhenyu, HUANG Yun, GAO Shanshan. State Key Laboratory of Oral Diseases & National Clinical Research Center for Oral Diseases & Department of Prosthetics, West China Hospital of Stomatology, Sichuan University, Chengdu 610041, China

Corresponding author: GAO Shanshan, Email: christina12357@163.com, Tel: 86-28-85503482

【Abstract】 Objective To study smile exposure in 20- to 30-year-olds with convex facial profiles and to explore the correlation between smile exposure and other aesthetic indicators, as well as psychological factors. **Methods** This study obtained ethical approval from the hospital. After they gave informed consent and portrait authorization, 80 young subjects aged 20-30 with convex facial profiles had their dynamic postural smile and spontaneous laughter recorded. The videos were imported into Photoshop CC software, key frames were selected, and the smile exposure was measured. The three-dimensional information of the subject's face in a resting state was obtained, the relevant aesthetic indicators were measured, and the satisfaction degree of their smile and laughter were evaluated. Correlation analysis was conducted for smile exposure and the relevant aesthetic indicators and subjective psychological evaluation. **Results** There were statistically significant differences in smile exposure, smile patterns, relevant aesthetic indicators and subjective psychological evalua-

【收稿日期】 2023-03-31; **【修回日期】** 2023-05-22

【基金项目】 四川省自然科学基金项目(2022NSFSC0365);四川省卫生健康委员会医学科技项目(21PJ060)

【作者简介】 祝丽青, 硕士, Email: 2509551655@qq.com

【通信作者】 高姗姗, 副教授, 博士, Email: christina12357@163.com, Tel: 86-28-85503482



微信公众号

tion between males and females aged 20 to 30 ($P < 0.05$). There was a large gap between males and females in the average opening degree when laughing, males having 5 times that of females, while the average gingival exposure height of the maxillary central incisor in males was approximately 1/2 of that in females. The average nasolabial angle of males ($99.80^\circ \pm 7.96^\circ$) was larger than that of females ($96.26^\circ \pm 7.31^\circ$) ($P < 0.05$), while the average ratio of upper lip length to the length of the lower 1/3 of the face of males ($33.73\% \pm 2.35\%$) was less than that of females ($38.57\% \pm 2.76\%$) ($P < 0.05$). The average psychological score of males (57.75 ± 13.46) was higher than that of females (53.69 ± 17.95) ($P < 0.05$). The ratios of maxillary teeth and gingival exposure to oral fissure in the postural smile were positively correlated with the nasolabial angle. The oral fissure width in spontaneous laughter was negatively correlated with psychological score. **Conclusion** Convex-faced males and females aged 20 to 30 have different smile exposures and smile patterns. Males tend to smile more openly with a larger opening and less gingival exposure, while females tend to grin with a small opening and more gingival exposure. Smile exposure is positively correlated with nasolabial angle and negatively correlated with smile satisfaction.

【Key words】 adolescent; smile; laughter; exposure; three dimensional image; nasolabial angle; psychological evaluation; aesthetic index; gingival exposure height; oral aesthetic repair

J Prev Treat Stomatol Dis, 2023, 31(11): 786-793.

【Competing interests】 The authors declare no competing interests.

This study was supported by Natural Science Foundation of Sichuan Province (No. 2022NSFSC0365); Medical Science and Technology Project of Sichuan Provincial Health Commission (No. 21PJ060).

在前牙美学修复中,笑容是一项重要的考量因素。笑容暴露量是指微笑或大笑时所暴露出的牙龈与牙体组织的量,可以最直观地体现动静态下患者的唇齿关系以及牙体、牙龈组织的展现情况与口裂的大小等信息。微笑时协调的唇齿关系^[1-2]、适当的牙齿与牙龈的显露和整齐亮白的牙齿是使笑容具有魅力的重要因素^[3-4]。然而以往的研究主要关注牙齿的色彩^[5]、形态^[6-7]、位置^[8-10]、比例^[11]和研究对象的笑线^[12]、颊廊的大小^[13-14]等,对于笑容暴露量的研究多是测量口内软硬组织暴露量,为临床应用提供笑容暴露量参考值。面部美学指标包括面下 1/3 比例的协调性和鼻唇角等。其中面下 1/3 比例的协调性体现为上唇长度与下颌骨长度之间的关系^[15-16],鼻唇角反映上颌骨的突度,两者一定程度上代表着面下 1/3 的骨骼和肌肉因素,其与笑容暴露量之间的相关性尚未明晰。此外,人的心理因素也是美学修复的重要考量^[17],以往的研究将关注点放在笑容对心理的影响上^[18],但实际上心理因素也会影响笑容暴露量。

20~30 岁的青年人是对美的需求相当强烈的人群^[19],这类人群的笑容暴露量也有其个性化的特征。因此,本研究将探究 20~30 岁的青年人笑容暴露量及笑容模式的区别,并探索笑容暴露量与相关美学指标和对自身笑容满意度之间的联系,为前牙美学修复提供参考。

1 资料和方法

1.1 研究对象

本研究纳入对象为 2021 年 2 月至 2022 年 7 月于四川大学华西口腔医院招募的受试者共计 94 例(男性 48 例,女性 46 例),其中凹面型有 9 例,直面型有 5 例,凸面型有 80 例。因绝大多数受试者为凸面型,为避免面型因素对试验结果有影响,故只选用凸面型受试者进行数据采集。本研究已获得四川大学华西口腔医院伦理委员会批准(批准号:WCHSIRB-D-2020-427)。受试者须了解本研究目的及研究方法,并签署知情同意书及肖像授权书。

纳入标准:①年龄 20~30 岁的青年男性及女性;②上下前牙及前磨牙均无缺失;③上下前牙及前磨牙区未行牙周手术;④未接受过正畸治疗;⑤未接受过正颌手术治疗;⑥上下前牙及前磨牙区未接受过树脂充填、冠修复或贴面修复治疗者;⑦鼻部及唇、颊部未行整形手术者(含鼻整形及注射手术、唇整形及注射手术、颊成形术等)。排除标准:①颌面部畸形者;②因各种原因无法配合完成数据采集者。

1.2 方法

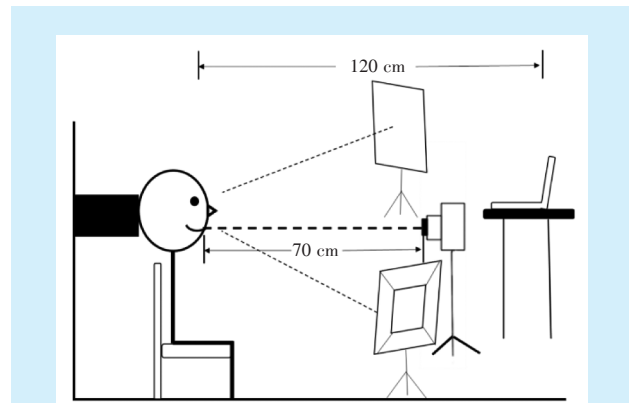
1.2.1 笑容暴露量的获取与测算 为受试者提供轻松愉快的环境,待受试者表示情绪放松后,嘱受试者直立上身,并从侧面观察受试者头顶-颏下点连线是否平行于墙壁,调整患者体位及头位至直立。将一硬质纸盒置于受试者枕骨后部与墙壁之

间以固定头部及限制头部动度,在两侧对称放置补光灯,补光灯色温为 $(5\,500 \pm 200)$ K,功率输出为31 W,将Canon EOS 90D单反相机(Canon,日本)镜头置于受试者口裂前方70 cm处进行录像。数据采集过程由置于双眼正前方120 cm的笔记本电脑(小米,中国)全程录像(图1)。先将一把长为20 cm的直尺置于受试者唇旁5 s,随后嘱受试者进行姿势位微笑的展示,再放映2 min幽默视频以采集受试者自发性大笑的瞬间。

信息采集结束后,将视频导入至Adobe Photoshop CC 19.1.0(Adobe,美国)软件中,选定受试者头位正且有直尺放置、姿势位微笑、自发性大笑的关键帧3帧。在所选取的关键帧中,以3 cm直尺长度为标尺,将两侧口角连线视为水平向口裂宽度,以上下唇红最低点距离为垂直向口裂长度,以上下中切牙切缘距离为开口度,选取双侧尖牙远中最凸点的距离为双侧尖牙距离,中切牙牙龈顶点与其垂线对应的唇红边缘作为上颌中切牙牙龈暴露高度,分别进行以上指标的测量(图2)。将上下唇红边缘以及口角视为口裂的边界,选取该区域视作口裂面积,然后分别选取姿势位微笑时暴露出的所有上、下颌牙体组织和牙龈组织、颊廊、上下牙列间区域分别进行暴露量的像素点数测算(图3)。

1.2.2 静息状态面下1/3美学指标的获取与测算

受试者放松面部,平视前方,使用3dMD Face三维颜面部扫描仪(3dMD,美国)进行面部三维扫描。截取人物正、侧貌图像并测量(图4)。唇前点



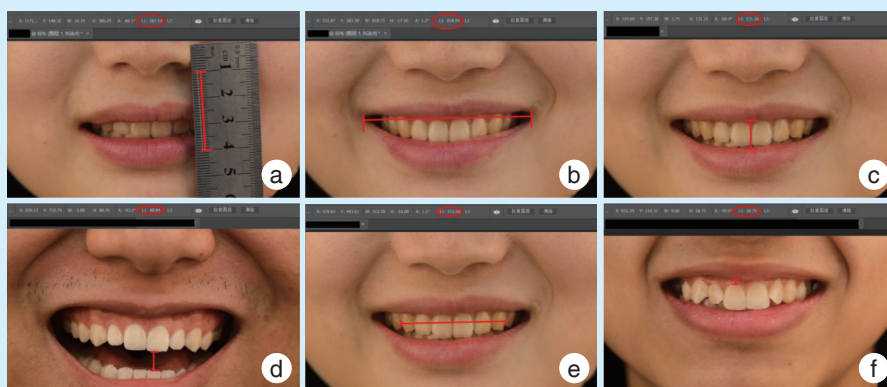
The subject was instructed to sit upright, adjust the body and head to an upright position, and place a hard cardboard box between the back of the subject's occipital bone and the wall to fix the head and limit the movement of the head. The fill light was put symmetrically on both sides. A Canon EOS 90D SLR camera was placed 70 cm in front of the subject's mouth cleft for video recording. The data collection process was recorded by a Xiaomi AIR laptop placed 120 cm in front of the eyes.

Figure 1 Schematic diagram of data collection of subjects' smile exposure

图1 受试者笑容暴露量数据采集示意图

与鼻小柱在鼻底点的交角为鼻唇角,鼻底点与上唇唇红最低点之间距离为上唇长度,鼻底点到颏底点的距离为面下1/3长度。上唇长度占面下1/3长度比例= $\frac{\text{图像中上唇长度}}{\text{图像中面下1/3长度}} \times 100\%$ 。以上所有操作均由同一人完成。

1.2.3 主观心理评价指标的获取 通过《牙科审美社会心理影响量表》(Psychosocial Impact of Dental



a: placed a ruler near the lips, captured the photo and measured the distance from 1 to 4 cm in the photo; b: measured distance between mouth corners as the horizontal fissure width; c: measured distance between the upper and lower lip as the vertical fissure length; d: measured distance between the maxillary and mandibular central incisors as the opening degree; e: measured distance between the most convex points of the canines' distal surface on both sides as the distance between the two canines; f: measured distance between the top point of maxillary central incisor and the corresponding lip edge as the exposure height of maxillary central incisor (the value in the red circle is the corresponding distance value in Photoshop CC software)

Figure 2 Distance measurements of smile exposure

图2 笑容暴露量相关的距离数据测量

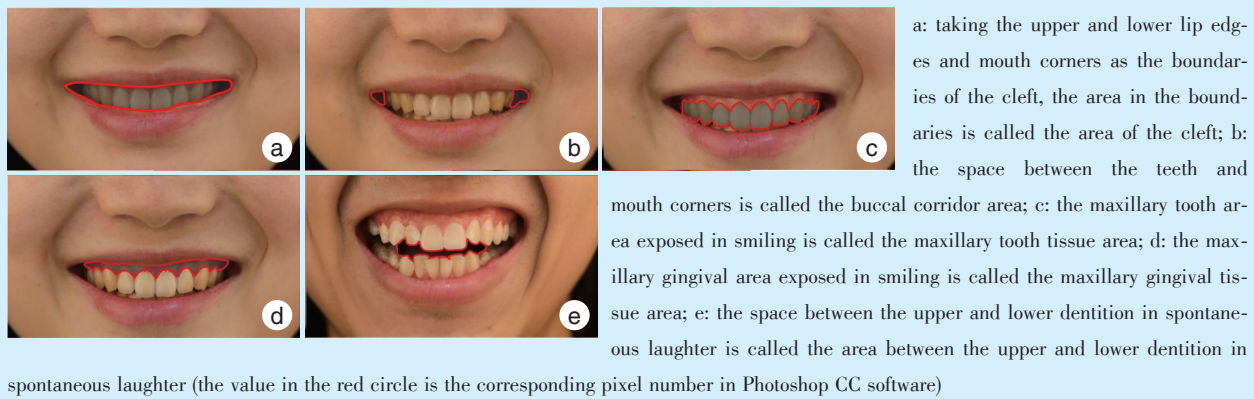


Figure 3 Area measurement of smile exposure

图3 笑容暴露量相关的面积数据测量

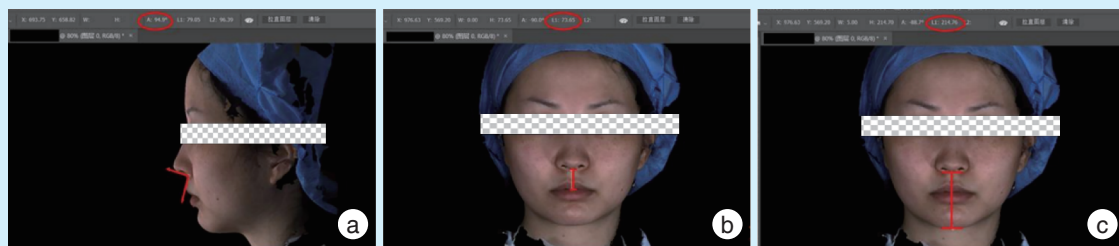


Figure 4 Measurement of aesthetic indicators in the lower 1/3 of the face

图4 面下1/3美学指标的测量

Aesthetics Questionnaire, PIDAQ)对受试者进行主观心理评价。该量表采用李克特量表的形式,总分分值越高,说明受试者对于自身笑容的美观满意度越高。

1.3 统计学分析

使用SPSS 23.0软件对数据进行统计分析。正态性检验显示所有数据均为正态分布,同类数据方差齐,对所测得的数据进行 t 检验。分别以心理测评得分、鼻唇角角度、上唇长度占面下1/3总长度之比为自变量,以所测的笑容暴露量各项指标为因变量,多次进行简单线性回归分析。检验水准 $\alpha=0.05$ 。

2 结果

2.1 笑容暴露量、面下1/3相关指标和心理评分

笑容暴露量相关数据见表1,男、女性在微笑及大笑时的水平口裂宽度以及微笑时的垂直向口裂长度都存在统计学差异($P<0.05$),且男性高于

女性。男性平均自发性大笑时的水平向口裂宽度较姿势位微笑时的水平向口裂宽度增加了(0.31 ± 0.39) cm,女性增加了(0.34 ± 0.42) cm,差异有统计学意义($P>0.05$);而男性平均垂直向口裂长度变化为(0.48 ± 0.32) cm,女性为(0.73 ± 0.44) cm,差异有统计学意义($P<0.05$)。女性从微笑变为大笑时,垂直向口裂长度增加得更多。

女性自发性大笑时的平均上颌中切牙牙龈暴露高度远高于男性,而平均开口度远小于男性,是男性的1/5($P<0.05$)。从垂直向看,男性大笑时倾向于张口笑,上下牙列间距离大,而女性并非开口大笑,会暴露更多牙龈组织,女性水平向口裂宽度更大。

女性姿势位微笑时上牙暴露量占口裂面积比例、自发性大笑时的上下颌软硬组织暴露量占口裂面积比例均显著高于男性($P<0.05$),而自发性大笑时男性的平均上下牙列间面积占口裂面积比例远高于女性,同样提示男性的笑容模式倾向于

表1 20~30岁凸面型青年男、女性笑容暴露量相关数据、面下1/3美学指标数据和心理评分数据分布
Table 1 Data distribution of smile exposure, aesthetic indicators and psychological score of males and females aged 20-30 years with convex facial profiles

Measurement indicators	Male	Female	<i>t</i>	<i>P</i>
Vertical fissure length in postural smile /cm	1.14 ± 0.30	0.81 ± 0.16	3.122	0.006
Vertical fissure length in spontaneous laughter /cm	1.68 ± 0.60	1.59 ± 0.41	1.959	0.066
Horizontal fissure width in postural smile /cm	6.36 ± 0.36	5.80 ± 0.38	7.004	< 0.001
Horizontal fissure width in spontaneous laughter /cm	6.69 ± 0.37	6.18 ± 0.40	6.199	< 0.001
Gingival exposure height of maxillary central incisor /mm	0.61 ± 0.99	1.24 ± 1.53	-2.267	0.036
Opening degree in spontaneous laughter /cm	0.40 ± 0.34	0.08 ± 0.14	2.716	0.014
Ratio of upper tooth exposure to fissure area in postural smile (%)	61.53 ± 12.90	71.71 ± 10.61	-3.895	< 0.001
Ratio of maxillary gingival tissue exposure to fissure area in postural smile (%)	10.98 ± 9.00	10.40 ± 14.52	0.211	0.834
Ratio of lower tooth exposure to fissure area in postural smile (%)	5.65 ± 6.85	8.33 ± 10.14	-1.385	0.170
Ratio of buccal corridor area to fissure area in postural smile (%)	9.95 ± 2.94	9.73 ± 2.51	0.524	0.602
Ratio of distance between maxillary canines to fissure width in postural smile (%)	63.44 ± 4.41	65.21 ± 3.57	-0.938	0.361
Ratio of upper tooth exposure to fissure area in spontaneous laughter (%)	43.95 ± 10.64	51.64 ± 12.50	-2.973	0.004
Ratio of maxillary gingival tissue exposure to fissure area in spontaneous laughter (%)	12.68 ± 7.47	19.95 ± 11.25	-3.403	0.001
Ratio of lower tooth exposure to fissure area in spontaneous laughter (%)	6.88 ± 6.28	13.69 ± 7.92	-4.271	< 0.001
Ratio of area between upper and lower dentition to fissure area in spontaneous laughter (%)	18.20 ± 12.72	5.20 ± 6.98	2.689	0.015
Nasolabial angle (°)	99.80 ± 7.96	96.26 ± 7.31	2.098	0.039
Ratio of upper lip length to the length of the lower 1/3 of the face (%)	33.73 ± 2.35	38.57 ± 2.76	-8.473	< 0.001
Psychological score*	57.75 ± 13.46	53.69 ± 17.95	-5.020	< 0.001

*: Psychological score calculated by Psychosocial Impact of Dental Aesthetics Questionnaire

开口大笑。

男性的平均上唇占面下1/3比例小于女性 ($P < 0.05$), 其平均鼻唇角和心理评分大于女性 ($P < 0.05$), 男性对自己的笑容美观满意度更高。

2.2 笑容暴露量与鼻唇角、心理测评得分的相关性分析

表2表明, 女性鼻唇角与姿势位微笑时上牙暴露量占口裂面积比例 ($r = 0.468, P = 0.002$)、自发

性大笑时上颌牙龈组织暴露量占口裂面积比例 ($r = 0.591, P < 0.001$)、自发性大笑时上牙暴露量占口裂面积比例 ($r = 0.639, P < 0.001$) 均为正相关, 线性回归方程见图5。男性鼻唇角与姿势位微笑时上牙暴露量占口裂面积比例 ($r = 0.393, P = 0.012$)、自发性大笑时上颌牙龈组织暴露量占口裂面积比例 ($r = 0.583, P < 0.001$)、自发性大笑时上牙暴露量占口裂面积比例 ($r = 0.357, P = 0.024$) 也

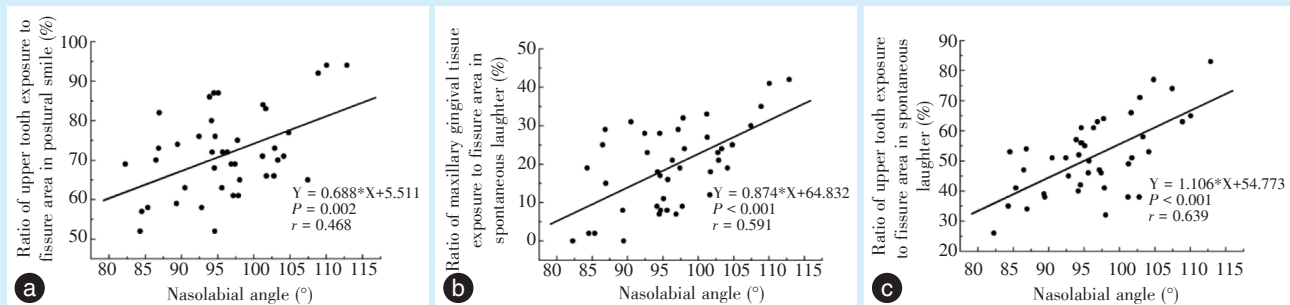
表2 20~30岁凸面型青年男、女性鼻唇角、心理测评得分与笑容暴露量的回归系数

Table 2 Regression coefficients of smile exposure on the nasolabial angle and the psychological score in males and females aged 20-30 years with convex facial profiles

Independent variable	Dependent variable	<i>r</i>	<i>F</i>	<i>b</i>	95%CI	<i>t</i>	<i>P</i>
Females	Nasolabial angle						
	Ratio of upper tooth exposure to fissure area in postural smile	0.468	11.255	0.688	0.273 1.103	3.355	0.002
	Ratio of maxillary gingival tissue exposure to fissure area in spontaneous laughter	0.591	21.070	0.874	0.489 1.260	4.490	< 0.001
	Ratio of upper tooth exposure to fissure area in spontaneous laughter	0.639	27.688	1.106	0.680 1.533	5.262	< 0.001
Males	Psychological evaluation score						
	Horizontal fissure width in spontaneous laughter	-0.400	6.981	-0.009	-0.015 -0.002	-2.640	0.011
	Nasolabial angle						
	Ratio of upper tooth exposure to fissure area in postural smile	0.393	6.932	0.637	0.140 1.133	2.624	0.012
	Ratio of maxillary gingival tissue exposure to fissure area in spontaneous laughter	0.583	19.632	0.498	0.269 0.728	4.431	< 0.001
	Ratio of upper tooth exposure to fissure area in spontaneous laughter	0.357	5.535	0.477	0.069 0.884	2.353	0.024
	Psychological evaluation score	-0.356	5.456	-0.010	-0.019 -0.001	-2.373	0.026

均为正相关,线性回归方程见图6。在男、女性中均存在鼻唇角越大,上颌软硬组织暴露量占口裂面积比例越大的现象。女性的鼻唇角与自发性大

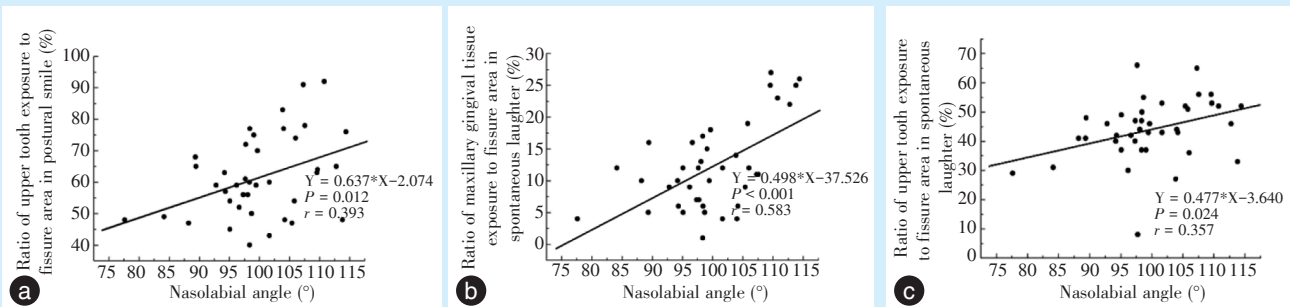
笑时上牙暴露量占口裂面积比例的相关性最大,男性的鼻唇角与自发性大笑时上颌牙龈组织暴露量占口裂面积比例的相关性最大。



a: correlation analysis of the ratio of upper tooth exposure to fissure area in the postural smile and the nasolabial angle; b: correlation analysis of the ratio of maxillary gingival tissue exposure to fissure area in spontaneous laughter and the nasolabial angle; c: correlation analysis of the ratio of upper tooth exposure to fissure area in spontaneous laughter and the nasolabial angle

Figure 5 Correlation analysis of smile exposure and nasolabial angle in females aged 20-30 years with convex facial profiles

图5 20~30岁凸面型青年女性笑容暴露量与鼻唇角的相关性分析



a: correlation analysis of the ratio of upper tooth exposure to fissure area in postural smile and nasolabial angle; b: correlation analysis of the ratio of maxillary gingival tissue exposure to fissure area in spontaneous laughter and the nasolabial angle; c: correlation analysis of the ratio of upper tooth exposure to fissure area in spontaneous laughter and the nasolabial angle

Figure 6 Correlation analysis of smile exposure and nasolabial angle in males aged 20-30 years with convex facial profiles

图6 20~30岁凸面型青年男性笑容暴露量与鼻唇角的相关性分析

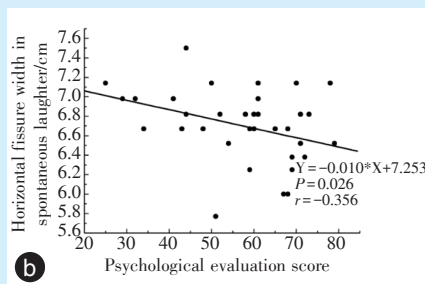
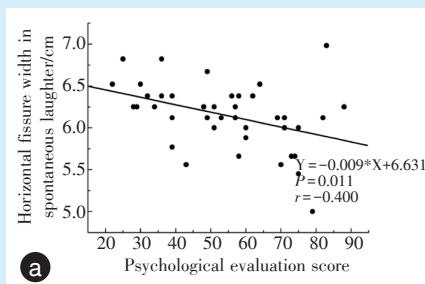
女性心理测评得分和自发性大笑时水平向口裂宽度为负相关($r = -0.400$, $P = 0.011$),男性的心理测评得分和自发性大笑时水平向口裂宽也是负相关($r = -0.356$, $P = 0.026$),线性回归方程见图7。男、女性的心理测评得分越高,自发性大笑时水平向口裂宽度越小。

3 讨论

本研究表明20~30岁凸面型男、女性青年人的笑容暴露量与鼻唇角和心理测评相关,姿势位微笑和自发性大笑时的上颌软硬组织暴露量与鼻唇角呈正相关,而自发性大笑时的水平向口裂宽

度与心理测评得分呈负相关。

情绪的强烈程度影响着笑容暴露量,在面无表情时的口裂宽度主要受骨骼影响,研究证实口裂宽度与齿间距离相关性最高,并且数据无性别差异^[20],当产生自发性笑容时,相较息止颌位,上唇高度升高了28%,而口裂宽度增加了27%^[21]。在本研究结果中,自发性大笑时,口裂垂直向增加较水平向增加显著,暴露了更多的上颌牙龈组织或者上下牙列间空间。男性牙龈组织暴露少,上下牙列间空间暴露多,女性则与之相反,这说明二者之间的笑容模式存在差别,男性为开口大笑,而女性为咧嘴露龈笑。这可能也与男、女性对自己



a: correlation analysis of horizontal fissure width in spontaneous laughter and the psychological evaluation score in females aged 20-30 with convex facial profiles; b: correlation analysis of horizontal fissure width in spontaneous laughter and the psychological evaluation score in males aged 20-30 with convex facial profiles. Psychological evaluation score calculated with the Psychosocial Impact of Dental Aesthetics Questionnaire

Figure 7 Correlation analysis of horizontal fissure width in spontaneous laughter and psychological evaluation score in males and females aged 20-30 years with convex facial profiles

图7 20~30岁凸面型青年男、女性自发性大笑时水平向口裂宽度与心理测评量表评分的相关性分析

笑容满意度相关,口裂宽度与心理评分呈负相关趋势,女性的心理评分显著更低,其大笑时不敢开口大笑而更倾向于咧嘴笑。

本研究结果表明鼻唇角越大,大笑时上颌软硬组织暴露量则越大。这可能是因为微笑及大笑时,上唇唇周肌肉牵拉,动态下的鼻唇角减小,从而暴露出上颌的软硬组织。静息状态下鼻唇角较大的人,在产生笑容时的鼻唇角变化较大;相反,静息状态下鼻唇角较小的人在微笑及大笑时,鼻唇角变化较小甚至没有变化。在本次的试验数据中,静息状态下女性鼻唇角与笑容暴露量的相关程度均高于男性,这可能是由于女性在笑时的上唇活动度高于男性且女性在放松状态下的上唇长度比男性短^[22],这可能也是造成女性组结果相关性高于男性组的原因之一。

在临床美学分析中,除了改变牙形、牙色,还应该改善患者的笑容暴露量,在患者面诊的过程中通过采集的照片和三维面扫信息^[23-24],分析患者的笑容暴露量,比对男、女性的平均笑容暴露量进行增量或减量的方案选择,并对可实现笑容暴露量增减的量化。关于上颌牙体和牙龈组织占口裂面积比例和自发性大笑时的水平向口裂宽度,也可以根据线性回归方程进行大致的计算。综合以上数据可大致制定方案,根据患者的具体要求可进一步调整。

在对患者进行美学分析时如患者的笑线为高笑线,还应明确其高笑线的成因,避免潜在的导致治疗失败的风险。研究发现20~30岁女性高笑线较多^[25-27],对于这类患者,美学修复可改善的有牙冠萌出不足和牙龈过度生长^[28],诊疗方案需要根据患者的露龈量来制定。当患者微笑时牙龈暴露

量为2~8 mm时,通过冠延长术结合美学修复的方式即可改善露龈笑;当患者在微笑时牙龈暴露量大于8 mm时,则被认为是上颌骨垂直向发育过度,需要正颌手术介入^[29]。而对于上唇过短导致的露龈笑,则需先判断是否存在骨性或牙性因素的影响,从而决定采用相应的治疗方式进行改善,如冠延长术或结合上唇重定位手术^[30-31]。若病因仅仅为上唇过短,则不应采用冠延长术或者上颌骨截骨术而是上唇重定位术。

本研究对象为20~30岁的凸面型青年,研究结果对这类患者的临床诊疗具有指导意义。但其他年龄段以及不同面型的人群同样也有着口腔美学修复的需求,因此还需在后续研究中针对更大范围年龄段以及其他面型的人群进行研究,以更全面地满足不同年龄段、不同面型患者的临床需求。

[Author contributions] Zhu LQ designed the study, collected and analyzed the data, wrote the article. Chen ZY and Huang Y designed the study, collected and analyzed the data, revised the article. Gao SS designed the study, guided and critically reviewed the article structures. All authors read and approved the final manuscript as submitted.

参考文献

- [1] Chan MYS, Mehta SB, Banerji S. An evaluation of the influence of teeth and the labial soft tissues on the perceived aesthetics of a smile [J]. Br Dent J, 2017, 223(4): 272-278. doi: 10.1038/sj.bdj.2017.713.
- [2] Jeelani W, Fida M, Shaikh A. The maxillary incisor display at rest: analysis of the underlying components [J]. Dental Press J Orthod, 2018, 23(6): 48-55. doi: 10.1590/2177-6709.23.6.048-055.
- [3] Papio MA, Fields HW, Beck FM, et al. The effect of dental and background facial attractiveness on facial attractiveness and per-

- ceived integrity and social and intellectual qualities [J]. *Am J Orthod Dentofac Orthop*, 2019, 156(4): 464-474.e1. doi: 10.1016/j.ajodo.2018.10.021.
- [4] Zaugg FL, Molinero-Mourelle P, Abou-Ayash S, et al. The influence of age and gender on perception of orofacial esthetics among laypersons in Switzerland [J]. *J Esthet Restor Dent*, 2022, 34(6): 959-968. doi: 10.1111/jerd.12906.
- [5] Joiner A, Luo W. Tooth colour and whiteness: a review [J]. *J Dent*, 2017, 67: S3-S10. doi: 10.1016/j.jdent.2017.09.006.
- [6] Koidou VP, Chatzopoulos GS, Rosenstiel SF. Quantification of facial and smile esthetics [J]. *J Prosthet Dent*, 2018, 119(2): 270-277. doi: 10.1016/j.prosdent.2017.04.002.
- [7] Haerian A, Rafiei E, Joshan N, et al. Impact of variations in maxillary lateral incisor dimensions on smile esthetics [J]. *Am J Orthod Dentofacial Orthop*, 2022, 161(1): 84-91. doi: 10.1016/j.ajodo.2020.06.047.
- [8] Paiva TT, Machado RM, Motta AT, et al. Influence of canine vertical position on smile esthetic perceptions by orthodontists and laypersons [J]. *Am J Orthod Dentofacial Orthop*, 2018, 153(3): 371-376. doi: 10.1016/j.ajodo.2017.07.018.
- [9] Babeer WA, Bakhsh ZT, Natto ZS. The perception of smile attractiveness to altered vertical position of maxillary anteriors by various groups [J]. *Medicine*, 2022, 101(9): e28660. doi: 10.1097/MD.00000000000028660.
- [10] Machado RM, Assad Duarte ME, Jardim da Motta AF, et al. Variations between maxillary central and lateral incisal edges and smile attractiveness [J]. *Am J Orthod Dentofacial Orthop*, 2016, 150(3): 425-435. doi: 10.1016/j.ajodo.2016.02.022.
- [11] Akl MA, Mansour DE, Mays K, et al. Mathematical tooth proportions: a systematic review [J]. *J Prosthodont*, 2022, 31(4): 289-298. doi: 10.1111/jopr.13420.
- [12] Arifagaoglu O, Yilmaz U. Analysis of gingival display during static and dynamic smiles in a Turkish sample: a clinical study [J]. *Eur Oral Res*, 2022, 56(1): 23-27. doi: 10.26650/eor.202288850.
- [13] Pisulkar SK, Agrawal R, Belkhode V, et al. Perception of buccal corridor space on smile aesthetics among specialty dentist and layperson [J]. *J Int Soc Prev Community Dent*, 2019, 9(5): 499-504. doi: 10.4103/jispcd.JISPCD_2_19.
- [14] Nimbalkar S, Oh YY, Mok RY, et al. Smile attractiveness related to buccal corridor space in 3 different facial types: a perception of 3 ethnic groups of Malaysians [J]. *J Prosthet Dent*, 2018, 120(2): 252-256. doi: 10.1016/j.prosdent.2017.10.021.
- [15] Kolte AP, Kolte RA, Samarth GK. Association of the nasolabial angle and lip length with the gingival and interdental smile line-a gender based evaluation [J]. *J Esthet Restor Dent*, 2021, 33(3): 503-509. doi: 10.1111/jerd.12657.
- [16] Kar M, Muluk NB, Bafaqeeh SA, et al. Is it possible to define the ideal lips? [J]. *Acta Otorhinolaryngol Ital*, 2018, 38(1): 67-72. doi: 10.14639/0392-100x-1511.
- [17] Pham TAV, Nguyen PA. Morphological features of smile attractiveness and related factors influence perception and gingival aesthetic parameters [J]. *Int Dent J*, 2022, 72(1): 67-75. doi: 10.1016/j.identj.2021.02.001.
- [18] Horn S, Matuszewska N, Gkantidis N, et al. Smile dimensions affect self-perceived smile attractiveness [J]. *Sci Rep*, 2021, 11(1): 2779. doi: 10.1038/s41598-021-82478-9.
- [19] Isiekwe GI, Aikins EA. Self-perception of dental appearance and aesthetics in a student population [J]. *Int Orthod*, 2019, 17(3): 506-512. doi: 10.1016/j.ortho.2019.06.010.
- [20] Zednfková Malá P, Krajiček V, Velemínská J. How tight is the relationship between the skeletal and soft-tissue facial profile: a geometric morphometric analysis of the facial outline [J]. *Forensic Sci Int*, 2018, 292(1): 212-223. doi: 10.1016/j.forsciint.2018.09.014.
- [21] Tarantili VV, Halazonetis DJ, Spyropoulos MN. The spontaneous smile in dynamic motion [J]. *Am J Orthod Dentofac Orthop*, 2005, 128(1): 8-15. doi: 10.1016/j.ajodo.2004.03.042.
- [22] Dahiya S, Negi G, Dahiya K, et al. Evaluating upper lip changes during smiling and at rest in Indian population [J]. *Indian J Dent Res*, 2021, 32(2): 167-173. doi: 10.4103/ijdr.IJDR_637_18.
- [23] Tanikawa C, Takada K. Test-retest reliability of smile tasks using three-dimensional facial topography [J]. *Angle Orthod*, 2018, 88(3): 319-328. doi: 10.2319/062617-425.1.
- [24] Mai HN, Win TT, Tong MS, et al. Three-dimensional morphometric analysis of facial units in virtual smiling facial images with different smile expressions [J]. *J Adv Prosthodont*, 2023, 15(1): 1-10. doi: 10.4047/jap.2023.15.1.1.
- [25] Andijani RI, Tatakis DN. Hypermobile upper lip is highly prevalent among patients seeking treatment for gummy smile [J]. *J Periodontol*, 2019, 90(3): 256-262. doi: 10.1002/JPER.18-0468.
- [26] Mahn E, Sampaio CS, Pereira da Silva B, et al. Comparing the use of static versus dynamic images to evaluate a smile [J]. *J Prosthet Dent*, 2020, 123(5): 739-746. doi: 10.1016/j.prosdent.2019.02.023.
- [27] Mele M, Felice P, Sharma P, et al. Esthetic treatment of altered passive eruption [J]. *Periodontol 2000*, 2018, 77(1): 65-83. doi: 10.1111/prd.12206.
- [28] Dym H, Pierre R. Diagnosis and treatment approaches to a "gummy smile" [J]. *Dent Clin North Am*, 2020, 64(2): 341-349. doi: 10.1016/j.cden.2019.12.003.
- [29] Garber DA, Salama MA. The aesthetic smile: diagnosis and treatment [J]. *Periodontol 2000*, 1996, 11: 18-28. doi: 10.1111/j.1600-0757.1996.tb00179.x.
- [30] Faus-Matoses V, Faus-Matoses I, Jorques-Zafrilla A, et al. Lip repositioning technique. A simple surgical procedure to improve the smile harmony [J]. *J Clin Exp Dent*, 2018, 10(4): e408-e412. doi: 10.4317/jced.54721.
- [31] Horn ROR, Joly JC. Treatment of gummy smile combining crown lengthening, lip repositioning, and the use of polyester threads [J]. *Clin Adv Periodontics*, 2023, 13(1): 42-45. doi: 10.1002/cap.10214.

(编辑 罗燕鸿,管东华)



官网