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Dental self-confidence in digital health marketing systems: Adolescent well-being and social media use

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ABSTRACT

Health marketing research has paid limited attention to how everyday digital platforms function as informal health marketing systems that shape adolescents' perceptions of appearance, self-worth, and treatment value. Positioning social media platforms as marketplace-mediated environments that produce health-related norms and consumer vulnerability, this study examines dental self-confidence (DSC) as a form of health-related market value among adolescents. Using data from 502 parent-child dyads in New Zealand and applying multivariate analysis and PLS-SEM, the findings show that lower dental self-confidence is associated with greater social and psychological impact (PI), with social impact operating as a key pathway. Active social media use was associated with a weaker protective DSC-PI association. This study extends health marketing theory by (a) conceptualizing dental appearance as a form of health-related market value, (b) positioning everyday digital platforms as informal health marketing systems, and (c) extending consumer vulnerability frameworks to adolescent health consumers navigating marketing-mediated appearance norms.

KEYWORDS

Adolescent psychosocial well-being; aesthetic concern; dental self-confidence; psychological impact; social impact; social media use

Introduction

Recent health marketing studies increasingly treat health and wellbeing as shaped by digitally mediated, data-driven environments that structure everyday expectations, evaluations, and individuals' behavior (Butt et al., 2019; Parkinson & Davey, 2021). These algorithmically powered social media and artificial intelligence platforms have transformed how health information and norms are produced, personalized, and disseminated (Park et al., 2018; Parkinson & Davey, 2023; Weingott & Parkinson, 2025). Rather than functioning merely as communication channels, digital platforms operate as environments in which ideas of normality, desirability, and risk are continuously constructed and evaluated (Abbasi et al., 2022). We define digital health marketing systems as networked digital environments, including everyday social media platforms, in which commercial logics of visibility, algorithmic recommendation, and peer-to-peer exchange jointly produce, circulate, and legitimize health-related norms, expectations, and values (Parkinson & Naidu, 2024). From a health marketing standpoint, the central gap is how these informal systems create value (e.g., information, support) and destroy value (e.g., appearance pressures, consumer vulnerability) for young health consumers when the marketed health attribute is visible, socially evaluated, and tied to treatment value (Elhajjar & Ouaida, 2022).

Within these systems, appearance-related health meanings are not produced only by clinicians or formal campaigns (Orben & Blakemore, 2023). Peer posts, creator content, advertising, and algorithmic visibility can make the smile a market-facing signal of confidence, attractiveness, and health, thereby shaping both perceived treatment value and vulnerability among adolescents (Bai et al., 2025; Freire et al., 2024; Mader et al., 2025; Parkinson & Davey, 2023). Evidence on social media and well-being is

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mixed because platform use is heterogeneous: interactive participation may create social support and social capital (Büchi, 2024; Ellison et al., 2007; Richter & Kazley, 2020), while passive or intensive comparison can intensify self-evaluative pressure (Huang, 2017; Kross et al., 2013; Meier & Reinecke, 2021; Verduyn et al., 2015, 2022). For health marketing, the important issue is therefore not total time online alone, but whether platform use exposes adolescents to marketplace-mediated appearance norms (Appel et al., 2016; Coyne et al., 2020; Orben et al., 2022; Vogel & Rose, 2016).

Adolescents represent a particularly important population within the context of social media and health marketing (Marino et al., 2018). They are among the most frequent users of social media and encounter social media-mediated environments during periods of identity formation and psychosocial vulnerability (Mader et al., 2025; Orben & Blakemore, 2023). While population-level effects on well-being appear small (Orben & Przybylski, 2019), more specific forms of appearance-focused engagement have been associated with anxiety, depression and diminished self-worth (Valkenburg et al., 2022; Vidal et al., 2020). These findings suggest that adolescents should be understood not simply as social media users, but as health consumers navigating digitally mediated appearance norms.

Despite extensive research on body image in digital contexts, dental aesthetics remains under-examined as a specific health-related market attribute. Dental appearance shapes interpersonal evaluation, social participation, perceived health, and treatment value, yet existing research has focused mainly on general body image, coarse time-online measures, or purpose-built digital health tools (Fernández-Cevallos et al., 2025; Gerson et al., 2017; Taibah & Al-Hummayani, 2017; Verduyn et al., 2015; Weingott & Parkinson, 2025). We therefore examine how dental self-confidence and aesthetic concern are associated with adolescent psychosocial outcomes, and whether active versus passive social media use conditions these associations in everyday digital health marketing systems.

Accordingly, this study asks how dental self-confidence and aesthetic concern relate to adolescent psychosocial outcomes, and how active versus passive social media use conditions these associations. We position adolescent oral-health experience within health marketing scholarship by treating everyday platform interaction as a source of marketplace-mediated health norms, perceived treatment value, and consumer vulnerability (Park et al., 2018; Parkinson & Davey, 2023; Parkinson & Naidu, 2024).

Conceptual framework and hypothesis development

Contemporary health-related experiences are increasingly shaped within marketing-mediated digital systems rather than through clinical encounters alone (Weingott & Parkinson, 2025). Within such systems, health meanings, norms, and expectations are continuously produced and reinforced through visual content, peer interaction, and algorithmic amplification, in which health-related value is socially constructed and differentially distributed, often privileging normative ideals of appearance, confidence, and visibility while marginalizing deviation from these norms (Elhajjar & Ouaida, 2022; Parkinson & Davey, 2023).

To theoretically explain how these environments produce psychosocial outcomes, the present study integrates Social Comparison Theory (SCT) (Festinger, 1954; Wood, 1989) and Self-Discrepancy Theory (SDT) (Higgins, 1987, 1989). Social media environments function as comparison architectures in which adolescents evaluate appearance relative to peers and idealized representations. These comparisons do not inherently produce distress; rather, they generate perceived discrepancies between the actual self and internalized appearance standards, which can then produce emotional and behavioral consequences. Accordingly, psychosocial impact emerges not directly from appearance features, but from repeated comparison-driven discrepancy formation embedded within digitally mediated interaction. The SCT-SDT integration extends health marketing theory in three ways. First, it reframes the mechanism linking platforms to outcomes as marketing-mediated exposure (input), comparison processes (mechanism), and health perceptions (output). Second, it specifies the content adolescents respond to: peer-generated appearance posts circulating within algorithmically powered feeds, influencer and creator content monetized through engagement, and explicit commercial messaging from dental, orthodontic, and cosmetic brands. Third, it distinguishes two appearance-related constructs that are often conflated: dental self-confidence refers to the socially oriented comfort an adolescent experiences when displaying their teeth in interaction (smiling, speaking, being photographed), whereas aesthetic concern refers to private dissatisfaction with the appearance of one's teeth assessed against an internalised ideal.

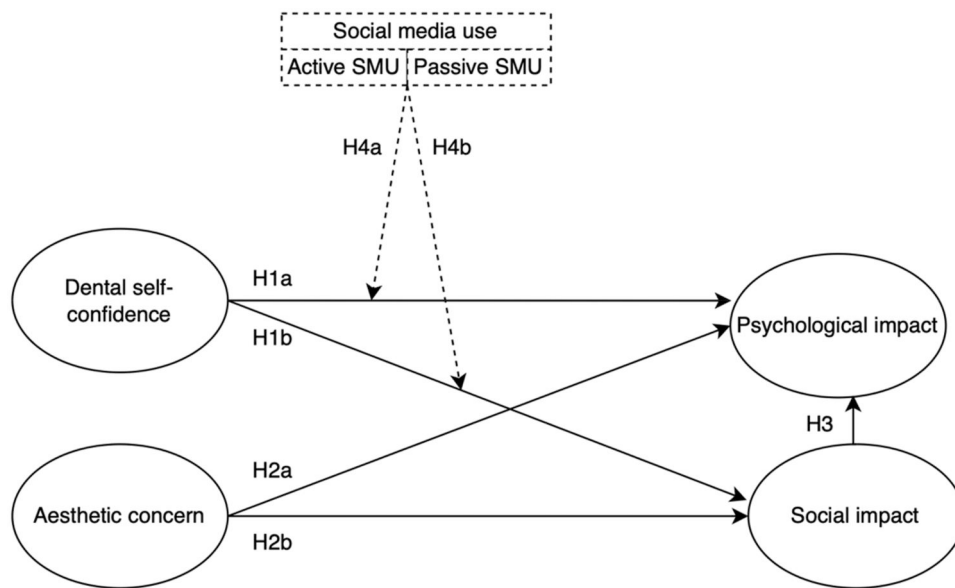


Figure 1. Conceptual framework illustrating the relationships between dental self-confidence, aesthetic concern, social and psychological impact, and the moderating role of social media use. *Source:* Authors' own creation.

Conceptually, dental self-confidence is interpersonally activated, while aesthetic concern is intrapersonally held; we therefore expect dental self-confidence to be the stronger predictor of social and psychological impact in peer-visible contexts.

For adolescents, these systems are particularly consequential. Social media platforms embed appearance as a key site of social evaluation, positioning visible bodily attributes, such as the smile, as markers of social acceptability and symbolic health capital (Taibah & Al-Hummayani, 2017). This conceptualization shifts attention from individual pathology to systemic processes through which vulnerability is produced. Within this integrated framework (Figure 1), digital comparison activates the awareness of appearance position (social comparison), while emotional outcomes arise when adolescents perceive a mismatch between their dental appearance and internalized ideals or perceived social expectations (self-discrepancy).

Dental self-confidence and psychosocial impact

The psychosocial impact of dental aesthetics extends beyond individual self-perception to reflect broader systems of social valuation in which health, appearance, and self-worth are symbolically linked (Kolawole et al., 2012; Parkinson & Naidu, 2024). Within digital marketing-mediated environments, dental appearance is not merely an aesthetic attribute but a visible marker through which social acceptability, confidence, and perceived health are evaluated (Richter & Kazley, 2020). As such, dental self-confidence cannot be understood solely as an individual psychological resource, but as a relational and socially produced form of health-related value, contingent on prevailing appearance norms and peer evaluation processes (Fernández-Cevallos et al., 2025). Research has consistently shown that dissatisfaction with dental appearance is associated with diminished self-esteem and heightened anxiety (Taibah & Al-Hummayani, 2017).

From a social comparison perspective, low dental self-confidence reflects upward comparisons in which adolescents perceive themselves as inferior relative to visible peers (Fernández-Cevallos et al., 2025; Wood, 1989). Self-discrepancy theory further suggests that these comparisons can produce actual-ideal discrepancies, generating feelings of shame, inadequacy, and jealousy (Higgins, 1987, 1989). Within visually comparative digital environments, where idealized images are algorithmically amplified and continuously circulated, dental self-confidence becomes vulnerable to erosion (Appel et al., 2016; Elhajjar & Ouaida, 2022; Vogel & Rose, 2016). This suggests that comparison provides the evaluative metric, while discrepancy explains the emotional response.

In this sense, the psychological consequences associated with dental self-confidence reflect structural exposure to appearance-based evaluation, rather than isolated psychological responses (Appel et al., 2016; Vogel & Rose, 2016). This framing challenges individualized interpretations of dental-related distress and underscores the need to examine how marketing-mediated digital contexts actively produce and legitimise appearance-based vulnerability (Ahmed et al., 2021; Marino et al., 2018). Within visually comparative social environments, we propose that dental self-confidence is significantly associated with feelings of jealousy and perceived inadequacy relative to peers, reflecting the psychosocial consequences of appearance-based comparison:

Hypothesis 1a (H1a): Lower dental self-confidence will be associated with greater psychological impact regarding dental aesthetics.

Social impact refers to the ways in which dental aesthetics shape adolescents' social experiences, including relationship-building, participation, and perceived social acceptance (Kolawole et al., 2012). Negative perceptions of dental appearance may lead to avoidance behaviors, heightened self-consciousness, and increased social monitoring, particularly during critical stages of social integration when peer approval, visibility, and belonging are central (Mader et al., 2025). In this sense, social impact reflects not merely interpersonal difficulty, but the social consequences of appearance-based evaluation, whereby poor dental self-confidence constrains social interaction within environments that privilege visible conformity to normative appearance standards (Parkinson & Naidu, 2024). Self-discrepancy theory predicts behavioral regulation following anticipated evaluation. When adolescents expect negative judgment, they withdraw from situations that expose or highlight the discrepancy. Thus, reduced smiling, speaking or participation becomes a protective strategy to avoid confirming comparison feedback (Fernández-Cevallos et al., 2025). Thus, we propose:

Hypothesis 1b (H1b): Lower dental self-confidence will be associated with greater social impact regarding dental aesthetics.

Aesthetic concern and psychosocial impact

Dissatisfaction with dental appearance has frequently been associated with psychosocial impairment; however, emerging evidence challenges the assumption that such dissatisfaction produces uniform or inevitable psychological harm (Parkinson & Naidu, 2024). Recent work demonstrates that the psychosocial impact of dental aesthetics is unevenly distributed and socially patterned, varying across demographic and social contexts rather than operating as a direct function of dissatisfaction alone (Fernández-Cevallos et al., 2025). This perspective shifts attention away from individualized deficit explanations and towards the conditions under which aesthetic concern becomes consequential for well-being.

Aesthetic concern can be conceptualized as internalization of appearance standards. It increases sensitivity to comparison information (social comparison) and heightens awareness of discrepancy (self-discrepancy), thereby amplifying the psychological consequences of social exposure in contemporary digital environments (Freire et al., 2024). These impacts are increasingly shaped by exposure to idealized and standardized representations of dental appearance circulated through social media (Vidal et al., 2020). From a critical health marketing perspective, such platforms function as normative systems that elevate aesthetic attributes as markers of health, confidence, and social legitimacy (Elhajjar & Ouaida, 2022; Parkinson & Naidu, 2024).

Importantly, the psychosocial consequences of aesthetic concern are unlikely to arise solely at the level of private self-evaluation (Klages et al., 2006). Rather, aesthetic concern becomes psychologically salient when it shapes expectations of social judgment or constrains participation in social interaction (Freire et al., 2024). Adolescents who internalize narrow appearance norms may experience heightened psychological strain through increased self-scrutiny and perceived discrepancy from idealized standards, even in the absence of overt negative feedback (Higgins, 1987; Vidal et al., 2020). High internalization increases the likelihood that comparisons confirm an actual-ideal discrepancy, even in the absence of

negative feedback, producing distress through perceived deviation, rather than objective evaluation. Accordingly, we propose:

Hypothesis 2a (H2a): Higher aesthetic concern will be associated with greater psychological impact regarding dental aesthetics.

At the same time, aesthetic concern may also exert influence through its social consequences (Abbasi et al., 2022). Anticipation of negative evaluation, fear of exposure, or perceived deviation from normative appearance ideals may lead adolescents to modify or restrict social behavior. Here, comparison activates discrepancy and behavioral regulation follows, transforming cognitive concern into observable social withdrawal. Such adaptations, manifesting as avoidance, self-monitoring, or reduced social engagement, reflect not individual fragility, but responses to environments in which appearance operates as a criterion for inclusion and acceptance (Appel et al., 2016). Accordingly, we suggest:

Hypothesis 2b (H2b): Higher aesthetic concern will be associated with greater social impact regarding dental aesthetics.

Critically, psychological impact is likely to be mediated by these social dynamics, rather than arising directly from aesthetic concern alone (Freire et al., 2024; Vidal et al., 2020). Social interactions provide the context in which internalized appearance concerns are activated, reinforced, or exacerbated (Abbasi et al., 2022). Behavioral restriction reduces corrective social feedback and reinforces perceived discrepancy, converting cognitive self-evaluation into sustained psychological distress (Higgins, 1987, 1989). Where aesthetic concern constrains social participation or heightens perceived exclusion, psychological distress may emerge as a downstream consequence. Consistent with this perspective, we hypothesize:

Hypothesis 3 (H3): Social impact will be positively associated with psychological impact.

The moderation role of social media use

Examining social media as a psychosocial health exposure requires moving beyond a simple use/non-use distinction and recognizing that qualitatively different forms of use carry different implications for adolescent wellbeing (Büchi, 2024; Elhajjar & Ouaida, 2022). Passive exposure can intensify upward comparison and discrepancy confirmation, whereas active engagement introduces reciprocal feedback that may recalibrate perceived self-standards. From a health marketing perspective, active engagement may weaken the protective association of dental self-confidence because adolescents who post, share, or seek feedback about appearance enter the marketplace-mediated comparison field on the supply side (Gerson et al., 2017). Their self-presentations become evaluable objects that invite direct comparison and reactive feedback, intensifying self-discrepancy salience in an appearance-sensitive domain (Verduyn et al., 2017). Therefore, boundary conditions include the visibility of the smile in posted content and the centrality of appearance to the platform's engagement architecture; we did not expect active use to behave protectively here in the way it may for general well-being. We therefore propose:

Hypothesis 4a (H4a): Active and passive social media use will moderate the association between dental self-confidence and psychological impact.

and

Hypothesis 4b (H4b): Active and passive social media use will moderate the association between dental self-confidence and social impact.

Methods

Sampling and data collection

The study sample consisted of 1004 participants in 502 paired parent-child dyads. Most parents were aged 35–44 (59.6%), with a nearly even gender distribution of 52.8% female and 47.0% male respondents. The largest ethnic groups were European (44.6%) and Māori (32.9%), with smaller representation from Asian, Pacific, and other ethnicities. Household income was varied, with 23.1% reporting an income of NZ\$106,000 or above. Most children were aged 12–15, with 31.1% aged 13 (Table 1).

Table 1. Sample characteristics.

Sample characteristics		<i>n</i>	%
Parents age	25–34	93	18.6
	35–44	298	59.6
	45–54	94	18.8
	55 above	17	3.4
Gender	Female	265	52.8
	Male	236	47.0
	Transgender	1	0.2
Ethnicity	European	224	44.6
	Māori	165	32.9
	Pacific peoples	34	6.8
	Asian	67	13.3
	MELAA (Middle Eastern / Latin American / African)	2	0.4
	Other ethnicity	10	2.0
Household income	Less than \$65,000	49	9.8
	\$65,000–\$73,999	37	7.4
	\$74,000–\$81,999	40	8.0
	\$82,000–\$89,999	48	9.6
	\$90,000–\$97,999	103	20.5
	\$98,000–\$105,999	109	21.7
	\$106,000 or above	116	23.1
Children age	12	105	20.9
	13	156	31.1
	14	103	20.5
	15	92	18.3
	16	38	7.6
	17	8	1.6
Total		1004 (502 dyads)	100

Source: Authors' own creation.

Participants were drawn from Dynata's (<https://www.dynata.com>) actively managed New Zealand consumer panel using stratified quota sampling on parent age, region, ethnicity, household income, and child age (12–17). Panelists were double-opt-in via email-verified Qualtrics, de-duplicated using device and IP fingerprints. Parent/guardian consent was obtained, and the survey received ethical approval from [Anonymized]. To safeguard response quality, the survey incorporated a child age screen, two embedded attention-check items, a minimum completion-time threshold (5 minutes), and straight-line/pattern-response, and bot detection; cases failing any check were excluded prior to analysis, yielding the final 502 dyads.

Parent-reported variables comprised demographic covariates, orthodontic treatment history, and the two social media use indicators (active and passive use). Child-reported variables comprised all focal psychosocial constructs: dental self-confidence (DSC), aesthetic concern (AC), social impact (SI), and psychological impact (PI). The dyad acted as the unit of observation, with parent-reported moderators and child-reported predictors/outcomes reducing single-source common-method variance for the focal paths. The achieved sample broadly matches the New Zealand 2023 Census distribution on parent age and household income, and approximates the youth population on European and Māori ethnicity, although Pacific Peoples and Asian populations remain modestly under-represented. Therefore, we treat the sample as informative about adolescent health-marketing patterns in high-income, English-speaking settings with comparable digital platform penetration, while returning to the issue of generalizability in the limitations section.

Measures

All construct items were adapted from prior studies with slight modifications to fit the dental self-confidence and adolescent self-report context. Questions used 5-point Likert scales ranging from 1 = strongly disagree to 5 = strongly agree, while social impact and psychological impact items ranged from 1 = never to 5 = always. Dental self-confidence (DSC) was measured with six items ($\alpha = 0.735$),

aesthetic concern (AC) with three items ($\alpha = 0.885$), social impact (SI) with seven items ($\alpha = 0.941$), and psychological impact (PI) with six items ($\alpha = 0.857$) (Table 6). These psychosocial dental scales were adapted from Klages et al. (2006), which were originally developed and validated in young-adult orthodontic populations. For the present adolescent self-report context (ages 12–17), items were minimally reworded for reading age, reviewed by two dental academics and three adolescents in a pre-test, and piloted prior to data collection.

The social media use (SMU) construct was divided into active and passive use (Gerson et al., 2017; Verduyn et al., 2017), each of which served as a moderator. Active use was defined as posting photos, commenting, talking to friends, making videos, and similar participatory behaviors; passive use was defined as scrolling, observing, and liking without posting or creating content. Parents allocated their child's typical weekly social media time across the two categories, so the indicators represent relative proportions of total use rather than absolute time or categorical "active/passive user" assignments. Full item wording, response anchors, and item-to-construct mapping are presented in Table 6. We acknowledge that these two single-item, parent-reported indicators are a substantive measurement limitation. They cannot capture platform-specific use, content type, engagement quality, or directionality of comparison. However, Rossiter (2002) suggested that a single-item measurement is adequate given the nature of the study and complexity of the construct. Thus, they were retained for pragmatic reasons as the dyadic design required a short parent block and proxy estimates of active/passive shares can be useful where adolescent recall of cumulative platform time is uncertain. Therefore, moderation results should be interpreted as indicative of patterned exposure rather than definitive estimates of platform-specific associations, and we return to this limitation below.

Analysis and results

Multivariate analysis of variance (MANOVA) results

A one-way MANOVA was conducted to examine between-group differences in Dental Self-Confidence (DSC), Social Impact (SI), and Psychological Impact (PI) associated with orthodontic treatment history and overall social media use. Treatment history was categorised as past, present, or no treatment, and social media use was categorized into low, moderate, and high use. Descriptive statistics indicated differences in mean scores across these groups, as summarized in Table 2.

The MANOVA is reported as a preliminary, descriptive step that establishes whether mean differences in the three psychosocial outcomes (DSC, SI, PI) exist across observable adolescent segments defined by orthodontic treatment history and overall social media exposure. It is positioned as complementary to, rather than parallel with, the PLS-SEM model: MANOVA describes which segments differ on the outcomes, while the PLS-SEM tests the marketing-mediated mechanism that connects DSC, SI and PI under active and passive use.

Multivariate testing

The multivariate analysis revealed statistically significant differences in the combined dependent variables by orthodontic treatment history (Pillai's Trace = .611, $F(6, 996) = 73.05$, $p < .001$, $\eta^2 = .306$), with additional support from Wilks' Lambda (Table 3). Treatment history accounted for approximately

Table 2. Descriptive statistics for DSC, SI, and PI across treatment groups.

	<i>n</i>	Dental self-confidence		Social impact		Psychological impact	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Orthodontic treatment history							
Past	254	3.73	0.51	3.38	0.94	3.99	0.74
Present	113	3.79	0.46	2.87	0.84	3.68	0.90
No treatment	135	2.74	0.76	1.66	0.93	2.53	0.81
Social media use							
Low use	158	3.38	0.69	2.31	1.13	3.26	1.04
Moderate use	282	3.49	0.76	2.99	1.08	3.67	0.98
High use	62	3.67	0.68	3.20	1.24	3.59	0.94

Source: Authors' own creation.

Table 3. Multivariate test results.

Effect	Statistic	Value	<i>F</i>	Hypothesis df	Error df	<i>p</i>	Partial η^2
Treatment	Pillai's trace	0.611	73.054	6	996	<.001	0.306
	Wilks' lambda	0.412	92.332	6	994	<.001	0.358
	Hotelling's trace	1.368	113.110	6	992	<.001	0.406
	Roy's largest root	1.325	219.988	3	498	<.001	0.570
Social media use	Pillai's trace	0.101	8.818	6	996	<.001	0.050
	Wilks' lambda	0.900	8.940	6	994	<.001	0.051
	Hotelling's trace	0.110	9.061	6	992	<.001	0.052
	Roy's largest root	0.097	16.088	3	498	<.001	0.088

Note: SS: sum of squares; df: degrees of freedom; MS: mean square; partial η^2 : partial eta squared.

Source: Authors' own creation.

Table 4. Between-subjects effects.

Dependent variable	Source	SS	df	MS	<i>F</i>	<i>p</i>	Partial η^2
Dental self-confidence (Cronbach's $\alpha = 0.788$)	Treatment	100.06	2	50.03	148.897	<.001	0.374
	Error	167.67	499	0.34			
Social impact (Cronbach's $\alpha = 0.937$)	Treatment	262.23	2	131.11	156.391	<.001	0.385
	Error	418.35	499	0.84			
Psychological impact (Cronbach's $\alpha = 0.769$)	Treatment	194.49	2	97.24	153.413	<.001	0.381
	Error	316.30	499	0.63			
Dental self-confidence	Social media use	3.72	2	1.86	3.51	.031	0.014
	Error	264.02	499	0.53			
Social impact	Social media use	58.36	2	29.18	23.40	<.001	0.086
	Error	622.22	499	1.25			
Psychological impact	Social media use	16.85	2	8.42	8.51	<.001	0.033
	Error	493.94	499	0.99			

Note: SS: sum of squares; df: degrees of freedom; MS: mean square; partial η^2 : partial eta squared.

Source: Authors' own creation.

30.6% of the variance in the composite scores of DSC, SI, and PI. Social media use was also significantly associated with the combined dependent variables (Pillai's Trace = 0.101, $F(6, 996) = 8.82$, $p < .001$, $\eta^2 = 0.050$), accounting for approximately 5% of the variance in the combined scores of DSC, SI, and PI.

Between-subjects effects

Separate ANOVAs for each dependent variable demonstrated significant between-group differences by orthodontic treatment history for DSC ($F(2, 499) = 148.90$, $p < .001$, $\eta^2 = .374$), SI ($F(2, 499) = 156.39$, $p < .001$, $\eta^2 = .385$), and PI ($F(2, 499) = 153.41$, $p < .001$, $\eta^2 = .381$), as shown in Table 3. These results indicate that treatment history is strongly associated with each score. Social media use was also statistically associated with Dental Self-Confidence ($F(2, 499) = 3.51$, $p = .031$, $\eta^2 = 0.014$), Social Impact ($F(2, 499) = 23.40$, $p < .001$, $\eta^2 = 0.086$), and Psychological Impact ($F(2, 499) = 8.51$, $p < .001$, $\eta^2 = 0.033$), with effect sizes ranging from small to moderate (Table 4).

Post hoc analysis

Post hoc comparisons using Tukey's HSD test revealed significant pairwise differences between treatment groups for each dependent variable (Table 5). Specifically, children who had past or present orthodontic treatment scored significantly higher on DSC, SI, and PI than those without treatment, highlighting notable distinctions based on orthodontic history.

Dental Self-Confidence (DSC): There is no statistically significant difference between the Past and Present groups ($p = .600$), suggesting that both groups report similar levels of dental self-confidence. However, both the Past and Present groups scored significantly higher than the No treatment group ($p < .001$), indicating that children with orthodontic treatment history (either past or present) tend to have higher dental self-confidence than those without any treatment. While Significant differences were observed only between the High use and Low use groups ($p = .025$), with the High use group reporting higher DSC. No significant difference was found between the Low and Moderate or Moderate and High groups

Social Impact (SI): All pairwise comparisons between treatment-history groups were statistically significant ($p < .001$). The Past group scored highest on social impact, followed by the Present group,

Table 5. Post hoc comparisons for pairwise differences across treatment groups and social media use categories.

Dependent variable	Group 1	Group 2	MD	Std. Error	p
Dental self-confidence	Past	Present	−0.06	0.07	.600
	Past	No treatment	0.99	0.06	<.001
	Present	No treatment	1.05	0.07	<.001
Social impact	Past	Present	0.51	0.10	<.001
	Past	No treatment	1.72	0.10	<.001
	Present	No treatment	1.22	0.12	<.001
Psychological impact	Past	Present	0.32	0.09	.001
	Past	No treatment	1.47	0.08	<.001
	Present	No treatment	1.16	0.10	<.001
Dental self-confidence	Low use	Moderate use	−0.11	0.07	.300
	Low use	High use	−0.29	0.11	.025
	Moderate use	High use	−0.18	0.10	.189
Social impact	Low use	Moderate use	−0.68	0.11	<.001
	Low use	High use	−0.89	0.17	<.001
	Moderate use	High use	−0.21	0.16	0.387
Psychological impact	Low use	Moderate use	−0.41	0.10	<.001
	Low use	High use	−0.32	0.15	.079
	Moderate use	High use	0.08	0.14	.823

Note: Group 1: low use; Group 2: moderate use; Group 3: high use.

Source: Authors' own creation.

with the No treatment group scoring lowest. This pattern suggests that adolescents with a history of orthodontic treatment, especially those treated in the past, report greater social impact related to dental appearance. For social media use, all pairwise comparisons were statistically significant ($p < .001$): the Low use group scored lowest, followed by Moderate and then High use, indicating that higher social media use is associated with greater social impact.

Psychological Impact (PI): Significant differences were found between all three treatment-history groups ($p < .001$), with the Past group reporting the highest psychological impact, followed by the Present group, and the No treatment group reporting the lowest scores. Orthodontic treatment history, particularly completed treatment, was therefore associated with a higher psychological impact compared with no treatment. For social media use, significant differences were found between Low and Moderate use ($p < .001$), while the Low-High comparison was weaker ($p = .079$) and the Moderate-High comparison was non-significant, suggesting that psychological impact may plateau between moderate and high use.

Table 5 illustrates that a history of orthodontic treatment (past or present) is associated with higher dental self-confidence, social impact, and psychological impact scores compared with no orthodontic treatment. The largest differences appear when comparing the No treatment group with the Past and Present groups, underscoring the durable associations between orthodontic history and these psychosocial factors (Figures 2 and 3).

Structural equation modeling analysis and results

This study utilized partial least squares structural equation modeling (PLS-SEM) to evaluate the measurement model and test the proposed hypotheses. PLS-SEM was selected due to its capacity to handle complex relationships and mitigate factor ambiguity in moderated-mediation models (Liengaard et al., 2021). This variance-based technique enhances the prediction of endogenous constructs while providing superior statistical power, making it well-suited for our analysis (Hair et al., 2014). It is particularly valuable for investigating the intricate effects of self-dental confidence, aesthetic concerns, social impact, and psychological impact, moderated by the intensity of social media use. We chose PLS-SEM over covariance-based SEM (CB-SEM) for three reasons consistent with Hair et al. (2022). First, our objective is predictive-explanatory (estimating the strength and direction of associations within a marketing-mediated mechanism) rather than confirmatory testing of a strict covariance structure. Second, the model combines mediation (DSC, SI, PI) with two-stage interaction terms (active and passive use moderating DSC, PI and DSC, SI); CB-SEM is better suited to encounter convergence and identification problems in such moderated-mediation specifications (Hair et al., 2022). Third, all latent constructs are conceptualized reflectively (DSC, AC, SI, and PI), each representing a single underlying psychosocial

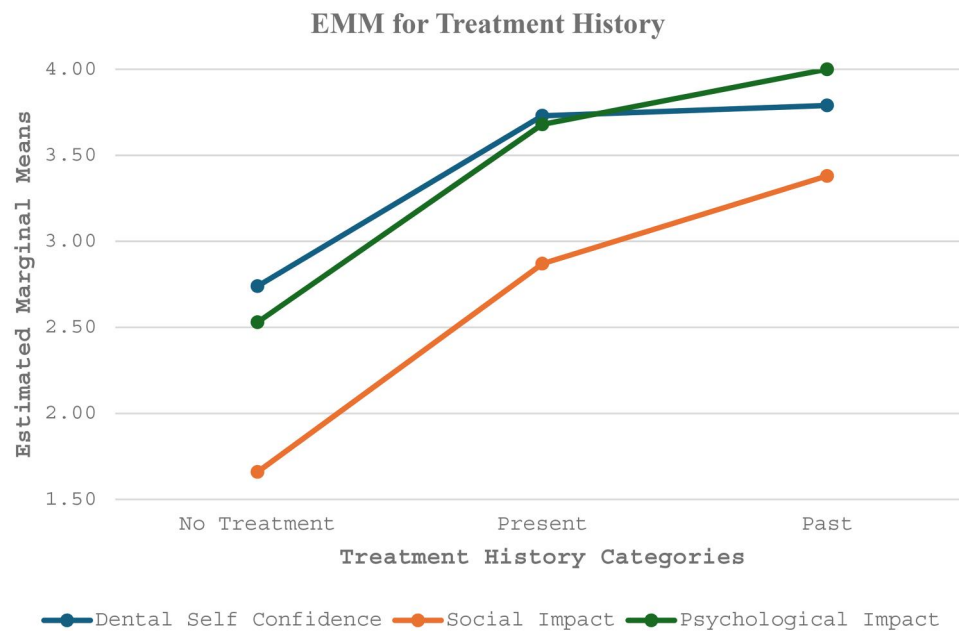


Figure 2. Estimated marginal means (EMM) for treatment history groups (past, present, and no orthodontic treatment) showing differences in dental self-confidence, social impact, and psychological impact. *Source:* Authors' own creation.

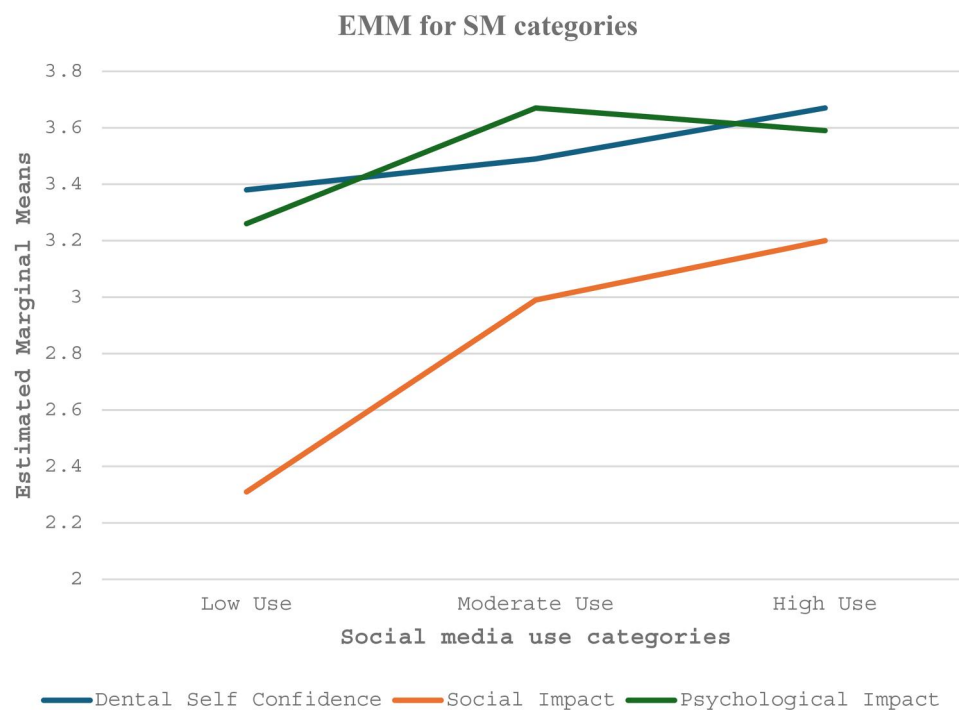


Figure 3. Estimated marginal means (EMM) for social media use categories (low, moderate, and high) showing differences in social and psychological impact scores. *Source:* Authors' own creation.

state, and PLS-SEM efficiently estimates reflective measurement models. The two social media use indicators were modeled as single-item observed variables forming the interaction terms with DSC, calculated using the two-stage approach.

Measurement model

Table 6 indicates that all retained items had loadings greater than 0.702, except DSC_1 ("I notice other people's teeth"). DSC_1 had an outer loading of 0.660, which falls between 0.40 and 0.70 and therefore required an outer-loading relevance test (Hair et al., 2014). The item was retained because it did not

Table 6. Measurement of constructs including validity and reliability.

Construct and items	Factor loading	VIF
<i>Reflective latent constructs</i>		
Dental self-confidence (Cronbach's $\alpha = 0.735$, CR = 0.853, AVE = 0.663)		
DSC_1: I notice other people's teeth	0.660	1.163
DSC_2: My teeth look bad	0.880	2.279
DSC_3: I am not happy with how my teeth look (R)	0.882	2.303
Aesthetic concern (Cronbach's $\alpha = 0.885$, CR = 0.913, AVE = 0.778)		
AC_1: I like my teeth in the mirror	0.780	2.456
AC_2: I like my teeth in photos	0.941	2.496
AC_3: I like my teeth on video	0.917	2.613
Social impact (Cronbach's $\alpha = 0.941$, CR = 0.953, AVE = 0.772)		
SI_1: Do you worry about what others think of your teeth?	0.878	3.211
SI_2: Do you worry that someone might say something about your teeth?	0.901	3.747
SI_3: Do you try to hide your teeth most of the time?	0.872	3.050
SI_4: Do you think that people stare at your teeth?	0.888	3.351
SI_5: Do you feel uncomfortable if people say anything about your teeth?	0.849	2.649
SI_6: Do you worry about what others your age think about your teeth?	0.883	3.252
Psychological impact (Cronbach's $\alpha = 0.857$, CR = 0.903, AVE = 0.700)		
PI_1: Are you jealous of how other people's teeth look?	0.878	2.687
PI_2: Are you upset by how your teeth look?	0.874	2.564
PI_3: Do you feel like other people have nicer teeth?	0.833	2.074
PI_4: Do you wish your teeth looked better?	0.755	1.718
<i>Single-item moderator measures</i>		
Active social media use		
SUM_A: on average, how many hours per day does your child actively use social media and entertainment platforms?	1.000	1.000
Passive social media use		
SUM_P: on average, how many hours per day does your child passively use social media and entertainment platforms?	1.000	1.000

Notes: Active and passive social media use were measured using single parent-reported items capturing average daily hours of use. As single-indicator moderator variables, their outer loadings are shown as 1.000 by definition. Internal consistency and convergent validity statistics (e.g., Cronbach's alpha, composite reliability, and AVE) are not applicable to single-item measures.

Source: Authors' own creation.

Table 7. Fornell–Larcker criterion for discriminant validity.

Variable	1	2	3	4	5	6
1 Active SM use	1.000					
2 Aesthetic concern	0.067	0.882				
3 Dental self confidence	−0.181	−0.015	0.814			
4 Passive SM use	0.580	−0.037	−0.196	1.000		
5 Psychological impact	0.145	0.028	−0.701	0.179	0.836	
6 Social impact	0.217	0.083	−0.715	0.205	0.805	0.879

Note: Bold diagonal elements are the square root of average variance extracted (AVE).

Source: Authors' own creation.

impair composite reliability (CR) or average variance extracted (AVE) (Hair et al., 2022). Items were removed only when their loadings were below 0.40, or when items in the 0.40–0.70 range reduced CR or AVE while adding limited content coverage. The minimum Cronbach's alpha (0.735) and CR (0.853) values in Table 6 indicate acceptable construct reliability. All constructs also had AVE values above the 0.5 threshold (minimum AVE = 0.663), demonstrating convergent validity. Discriminant validity was assessed using the Fornell–Larcker criterion and the heterotrait-monotrait (HTMT) ratio (Hair et al., 2014). The Fornell–Larcker criterion indicates that the square root of each construct's AVE exceeds its highest correlation with other constructs (Table 7), and the maximum HTMT value of 0.890 remains below the 0.9 threshold (Table 8), supporting discriminant validity (Hair et al., 2022).

Controlling for common method bias testing

To address common method bias (CMB), we adopted two strategies. First, we conducted a pilot study ($n = 15$) to refine survey-item clarity, used established measures from the literature, and interspersed questions on predictors, mediators, moderators, and outcomes throughout the survey (Podsakoff et al., 2012). Second, we performed a full-collinearity test as recommended by Kock (2017). Table 9 shows that most inner variance inflation factor (VIF) values are below 3.3 (maximum inner VIF = 3.337), and below 5.0, suggesting no strong collinearity-based indication of CMB. We note, however, that the full-collinearity VIF approach is a necessary but not sufficient diagnostic: it detects shared method variance only to the extent that such variance inflates collinearity among predictors, and it does not rule

Table 8. Heterotrait-monotrait (HTMT) values for discriminant validity.

Variable	1	2	3	4	5	6
1 Active SM use						
2 Aesthetic concern	0.073					
3 Dental self confidence	0.209	0.192				
4 Passive SM use	0.580	0.055	0.225			
5 Psychological impact	0.157	0.056	0.874	0.190		
6 Social impact	0.224	0.080	0.862	0.211	0.890	

Source: Authors' own creation.

Table 9. Inner variance inflation factor (VIF) values for full collinearity test.

Variable	1	2	3	4	5	6
1 Active SM use		1.546	1.542	1.059	1.532	1.537
2 Aesthetic concern	1.019		1.010	1.019	1.019	1.015
3 Dental self confidence	2.205	1.009		2.218	2.066	1.990
4 Passive SM use	1.053	1.526	1.529		1.529	1.547
5 Psychological impact	3.074	1.114	2.875	3.181		1.969
6 Social impact	3.284	1.172	2.950	3.337	2.115	

Source: Authors' own creation.

Table 10. Structural equation modeling results

Endogenous construct	R^2					
Psychological impact	0.686***					
Social impact	0.535***					
Structural path	Coefficients	SD	CI 95%		p	f^2
			LCI	UCI		
Dental self confidence -> psychological impact	-0.254	0.045	-0.341	-0.164	.000	0.099
Dental self confidence -> social impact	-0.698	0.026	-0.748	-0.646	.000	0.967
Aesthetic concern -> psychological impact	-0.020	0.029	-0.076	0.038	.476	0.001
Aesthetic concern -> social impact	0.077	0.048	-0.045	0.150	.136	0.010
Social impact -> psychological impact	0.632	0.043	0.549	0.716	.000	0.607
Active SM use $\times$ dental self confidence -> psychological impact	0.071	0.026	0.021	0.122	.008	0.012
Active SM use $\times$ dental self confidence -> social impact	-0.040	0.034	-0.110	0.026	.221	0.003
Passive SM use $\times$ dental self confidence -> psychological impact	-0.027	0.028	-0.083	0.028	.340	0.002
Passive SM use $\times$ dental self confidence -> social impact	0.042	0.033	-0.023	0.106	.200	0.003
Indirect effects						
Dental self confidence -> social impact -> psychological impact	-0.44	0.037	-0.513	-0.37	.000	

Note: Two-tailed test. SD: standard deviation; CI: confidence interval; LCI: lower confidence interval; UCI: upper confidence interval.

Source: Authors' own creation.

out systematic response-style or social-desirability bias. The dyadic design partly mitigates this concern because social media use is parent-reported while the psychosocial constructs are child-reported; nonetheless, results relying on within-respondent associations should be interpreted with this limitation in mind.

Analytical model

We evaluated the significance of path coefficients in the PLS-SEM inner model using a 5,000-subsample bootstrapping method (Hair et al., 2014). Table 10 shows that the R^2 values for psychological impact ($R^2 = 0.686$, $p < .001$) and social impact ($R^2 = 0.535$, $p < .001$) all exceed the recommended threshold of 0.10 (Falk & Miller, 1992).

We assessed our model's fit using several key indices. The Standardized Root Mean Square Residual (SRMR) was 0.058, below the 0.08 threshold for a good fit. We also calculated the Unweighted Least Squares discrepancy (d_{ULS}) at 0.571 and the Geodesic discrepancy (d_G) at 0.255. Together, these indices suggest an acceptable model fit (Hair et al., 2022). The SRMR, in particular, indicates a good fit between observed and predicted correlations.

We evaluated the model's out-of-sample prediction errors using the cross-validated predictive ability test (CVPAT), employing k-fold cross-validation to mitigate overfitting or underfitting in PLS-SEM (Liengaard et al., 2021). Table 11 compares the average loss values of PLS-SEM predictions against naive indicator averages (IA) and linear model (LM) forecasts. A negative difference in average loss values

Table 11. Results of out-of-sample predictive relevance (CVPAT)

Variable	CVPAT PLS-SEM vs IA		CVPAT PLS-SEM vs LM	
	Average loss difference	p Value	Average loss difference	p Value
Psychological impact	−0.573	.000	0.013	.196
Social impact	−0.708	.000	−0.002	.840
Overall	−0.654	.000	0.004	.577

Source: Authors' own creation.

indicates superior predictive performance of the PLS-SEM model compared to both benchmarks (Sharma et al., 2023). As shown in Table 11, our PLS-SEM, demonstrates superior predictive performance.

Hypotheses 1a and 1b proposed that dental self-confidence would be negatively associated with psychological and social impact. The results in Table 11 show a significant negative association between dental self-confidence and psychological impact ($\beta = -0.254$, $p < .001$, $f^2 = 0.099$), and between dental self-confidence and social impact ($\beta = -0.698$, $p < .001$, $f^2 = 0.967$). These findings indicate that greater confidence in one's dental appearance is associated with lower reported social and psychological impact.

Hypotheses 2a and 2b proposed that aesthetic concern would be positively associated with psychological and social impact. The results show non-significant associations between aesthetic concern and psychological impact ($\beta = -0.020$, $p = .476$, $f^2 = 0.001$), and between aesthetic concern and social impact ($\beta = 0.077$, $p = .136$, $f^2 = 0.010$).

Hypothesis 3 proposed that social impact would be positively associated with psychological impact. The results show a significant positive association between social impact and psychological impact ($\beta = 0.632$, $p < .001$, $f^2 = 0.607$). Social impact also partially mediated the association between dental self-confidence and psychological impact. The indirect association from dental self-confidence to psychological impact through social impact was significant ($\beta = -0.440$, $p < .001$), suggesting that part of the DSC-PI association operates through social impact.

Hypotheses 4a and 4b proposed that active and passive social media use would moderate the associations between dental self-confidence and psychological/social impact. The interaction between active social media use and dental self-confidence was positively associated with psychological impact ($\beta = 0.071$, $p < .001$, $f^2 = 0.012$) (Table 11). Figure 4 indicates that lower active social media use is associated with a stronger negative DSC-PI association, whereas higher active social media use modestly weakens this association. Active SMU was not significantly associated with social impact ($\beta = -0.040$, $p = .221$, $f^2 = 0.003$). Passive SMU was not significantly associated with either psychological ($p = .340$) or social ($p = .200$) impact.

The active SMU $\times$ DSC interaction on psychological impact is statistically significant but small; it modestly attenuates, but does not reverse, the protective DSC-PI association. We therefore do not claim that active use causes psychological harm. Rather, the marketing-mediated comparison architecture appears to weaken the buffering role of socially oriented dental confidence at the margin. The non-significant H2a/H2b findings for aesthetic concern are consistent with the fact that aesthetic concern was operationalized as a private, intrapersonal evaluation of dental appearance, whereas SI and PI are interpersonally activated. In peer-visible digital contexts, private dissatisfaction that is not anticipated to attract social judgment may remain cognitively present yet socially silent, leaving it unconnected to social and psychological impact in this sample.

Discussion

This study shows that dental self-confidence is not a private psychological appraisal or a clinical attribute, but a socially embedded health perception shaped within peer-visible digital environments. Drawing on social comparison theory and self-discrepancy theory (Festinger, 1954; Higgins, 1987, 1989; Wood, 1989), the findings suggest that dental appearance becomes consequential when comparison processes turn the smile into a socially evaluated marker of health, confidence, and treatment value. This interpretation extends prior studies on dental aesthetics by locating adolescent oral-health experiences within health

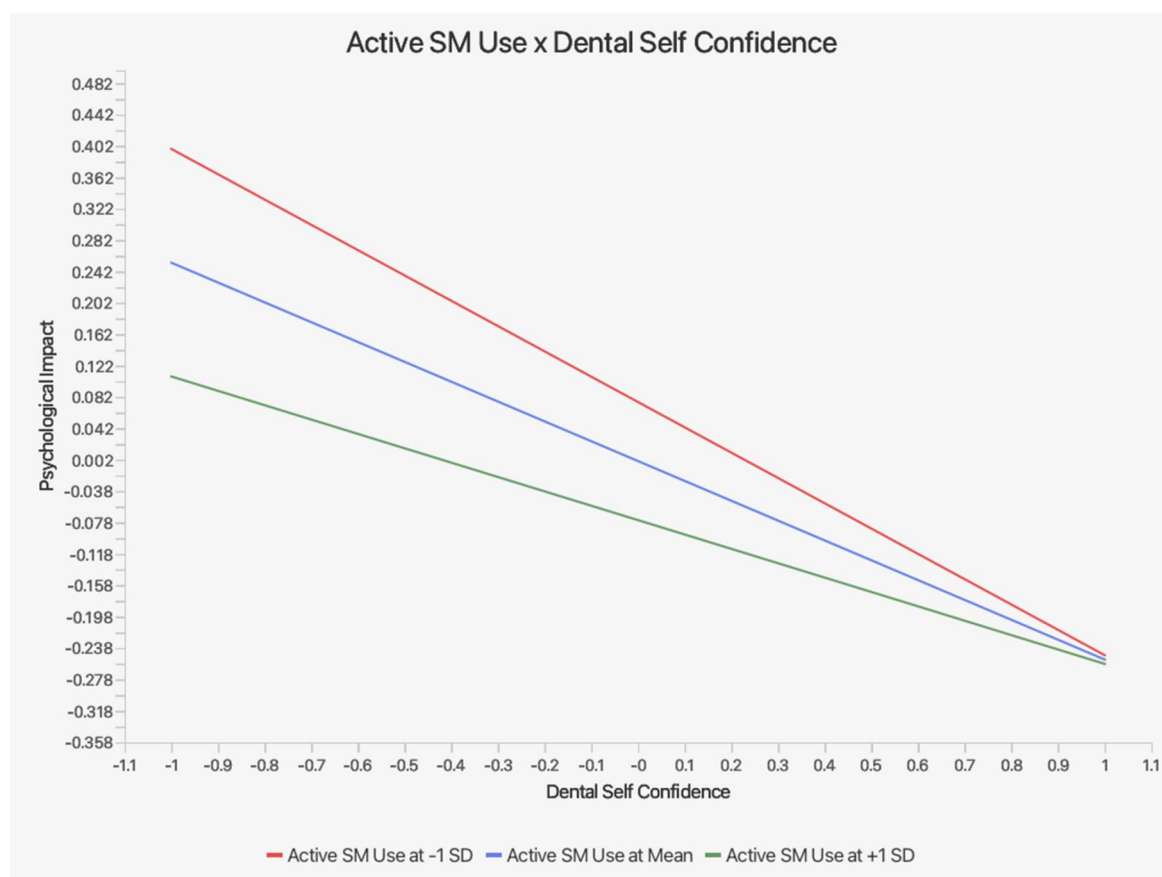


Figure 4. Moderating effect of active social media use on the relationship between dental self-confidence and psychological impact. *Source:* Authors' own creation.

marketing systems that create value, produce vulnerability, and shape consumer behavior (Parkinson & Davey, 2023; Parkinson & Naidu, 2024). Taken together, the DSC findings indicate that the relevant health marketing mechanism is not limited to digital exposure, but the exposure that makes dental appearance socially evaluable. In that setting, lower DSC becomes a marker of vulnerability because it links visible appearance to anticipated peer judgment and to the perceived value of treatment (Appel et al., 2016; Fernández-Cevallos et al., 2025; Vogel & Rose, 2016).

The mediation results identify social impact as the key pathway, as dental self-confidence is associated with psychological impact, partly because it shapes adolescents' social participation, peer monitoring, and willingness to display the smile in everyday interactions. This suggests that social impact is the social route through which marketplace-mediated appearance norms become psychologically consequential (Freire et al., 2024; Kolawole et al., 2012; Parkinson & Naidu, 2024).

Contrary to expectation, aesthetic concern was not significantly associated with social or psychological impact. One explanation lies in the construct distinction: dental self-confidence reflects adolescents' comfort in social interaction, whereas aesthetic concern captures private evaluations of appearance. Self-discrepancy theory helps clarify this distinction. Discrepancies are most emotionally salient when they are socially activated rather than privately held (Higgins, 1987). Similarly, social comparison theory suggests that distress intensifies when evaluations occur within salient interpersonal contexts (Festinger, 1954). If aesthetic concern remains internal and does not translate into anticipated peer judgment, discrepancy may remain cognitively present but not socially consequential. Thus, our findings suggest that psychosocial outcomes are more strongly associated with socially oriented confidence than with individual aesthetic judgment (de Jong-Lenters et al., 2014).

The moderating role of social media use suggested that active use (posting, sharing, interacting) weakened the protective association between dental self-confidence and psychological outcomes,

whereas passive use had no significant moderating association. Although active use is often associated with social connectedness (Ellison et al., 2007; Gerson et al., 2017), the present findings suggest that, in appearance-sensitive domains such as dental aesthetics, active participation may amplify self-presentational pressure and exposure to evaluative feedback. This pattern should be interpreted cautiously because the interaction effect was small, but it supports the broader argument that active use is not uniformly protective in health marketing contexts where visible appearance is the object of marketplace evaluation (Ozimek et al., 2023; Verduyn et al., 2022).

The orthodontic-treatment pattern is particularly important: adolescents with treatment history reported higher self-confidence but also higher social and psychological impact. This paradox suggests that clinical intervention can increase both confidence and salience (Kolawole et al., 2012; Taibah & Al-Hummayani, 2017). Once treatment makes the smile a focal object of marketplace value, adolescents may evaluate the intervention through peer-visible and platform-visible comparison. In value terms, treatment may create clinical value while also generating co-destructive psychosocial vulnerability; in consumer-behavior terms, it increases post-treatment evaluation of the smile as a market-facing signal (Parkinson & Davey, 2021, 2023; Parkinson & Naidu, 2024).

Theoretical contribution

This study contributes to health marketing literature in four specific ways. First, we conceptualize dental appearance as a form of health-related market value. Within marketing-mediated digital environments, the smile functions as visible health capital that is socially priced through comparison and self-discrepancy processes; dental self-confidence is therefore re-specified as an individual-level perception of one's market value in appearance-sensitive exchange, rather than as a clinical attribute.

Second, we position everyday digital platforms as informal health marketing systems. Health marketing scholarship has traditionally focused on formal communications by health institutions; we show that peer- and influencer-generated appearance content, circulating through algorithmically mediated feeds, performs much of the norm-setting efforts that formal health marketing once monopolized, and therefore belongs inside the health marketing system rather than outside it.

Third, we extend consumer vulnerability frameworks by identifying appearance-sensitive adolescents as a structurally vulnerable segment whose vulnerability is co-produced by developmental stage, peer-visible platform architecture, and marketing-mediated appearance norms, not by individual deficit. The asymmetric moderation pattern (active use weakens rather than strengthens the association of DSC) is novel in the consumer vulnerability literature and shows that active participation is not uniformly protective in appearance-sensitive health domains.

Fourth, the orthodontic paradox suggested in our findings contributes to value co-creation theory by showing that a clinical health intervention can deliver consumer-perceived clinical value while simultaneously generating co-destructive psychosocial value at the marketplace level, a pattern that we suggest will recur across other visible health interventions (e.g., dermatological, weight-related, cosmetic dental).

Managerial/practical implications

The current study highlights several key implications for practice, across a range of industries and social contexts. Dental practitioners should broaden treatment discussions beyond clinical alignment needs and include adolescents' social confidence. For example, as dental self-confidence is closely related to social and emotional well-being, clinicians should ask about comfort smiling, speaking and being photographed, and manage expectations regarding aesthetic outcomes accordingly. During treatment, consideration should be given to discussion of peer attention regarding the visibility of dental appliances, and clinicians could incorporate discussions of social media use and appearance norms into consultations.

Schools and adolescent support services should include digital self-presentation and social media consumption literacy in adolescent-focused programmes, acknowledging that aesthetic dissatisfaction can contribute to declines in social functioning. Parents should be advised that orthodontic

treatment may increase negative awareness of appearance before improving dental self-confidence, and enter into open discussions of sources of appearance-focused self-worth, encouraging adolescents to avoid tying self-esteem to peer reactions about their teeth. At a policy level, oral health messaging should move away from idealized “smile” imagery, towards more achievable norms of good oral health and function. For health marketers and dental/orthodontic brands, the findings indicate that advertising creative built around aspirational, idealized smiles is likely to deepen consumer vulnerability for adolescent audiences and may erode the protective value of socially oriented dental self-confidence. We recommend (i) shifting creative away from comparison-inviting hero imagery towards realistic, functional and diverse smile representations, (ii) avoiding influencer partnerships whose content explicitly invites appearance comparison among adolescents, and (iii) communicating treatment timelines and post-treatment social adjustment as part of the value proposition rather than only end-state aesthetics.

For dental and orthodontic clinics, marketing materials and consultation scripts should be rebalanced towards function-and-confidence outcomes; appointment journeys can incorporate brief screening for appearance-focused social media exposure so clinicians can flag at-risk patients before, during, and after treatment. For public health campaigns, the orthodontic paradox suggests that oral-health communications should explicitly counter-frame the marketplace-mediated norm that “a perfect smile” is a prerequisite for social participation, and instead promote norms of healthy function, inclusion and treatment adherence. For digital platform governance, our findings give empirical support to platform-level interventions targeting appearance-focused content surfaced to minors, such as restricting algorithmic amplification of cosmetic-dentistry and influencer-driven smile content in feeds served to under-18 accounts, providing “cool-down” nudges after extended appearance-content sessions, and requiring clear labeling of edited or commercially sponsored smile imagery. For policymakers, these actions should be coordinated with consumer-protection regulators so that the disclosure regime for adolescent-targeted health and appearance advertising explicitly recognizes appearance-sensitive minors as a protected consumer segment.

Limitations and future research

This study should be interpreted in light of several limitations. First, the cross-sectional design does not allow causal inference. Although the findings identify significant associations between psychosocial factors, social media use, and treatment-related perceptions, the temporal ordering of these relationships cannot be established. Future research could strengthen this area by using longitudinal or panel designs to examine whether changes in social media use are associated with subsequent changes in adolescents’ dental self-confidence, aesthetic concern, and psychosocial impact over time. Experimental studies may also help clarify whether exposure to appearance-focused social media content intensifies self-discrepancy and treatment-related perceptions in oral health contexts. We emphasize that the cross-sectional design is a substantive constraint on the causal claims a health marketing study can make about marketing-mediated exposure: while the mediated and moderated paths estimated here are consistent with the proposed comparison–discrepancy mechanism, the data cannot rule out reverse causation (e.g., adolescents lower in DSC selecting into more appearance-focused content) or simultaneous determination.

Second, the study relied on self-report measures, with some degree of parent involvement in survey completion, which may introduce recall bias, proxy-report bias, or social desirability effects. This is especially relevant in adolescent health contexts, where perceptions of appearance, social comparison, and emotional impact may not be fully observable to parents. Future studies would benefit from multi-informant designs that distinguish between adolescent self-reports and parent reports, or from mixed-method approaches that capture how adolescents themselves interpret dentofacial appearance and treatment need.

Third, social media use was measured through parent-reported single-item indicators of active and passive use. Although this operationalization was informed by prior literature (e.g., Verduyn et al., 2017), it captures only a limited aspect of the broader social media use construct. In particular, it does not distinguish between platform types, content characteristics, interaction quality, or the social and visual contexts in which use occurs. Future research should employ richer multi-item measures and,

where possible, complement survey responses with behavioral indicators such as screen-time logs, platform-specific usage patterns, or digital trace data. This would allow researchers to assess whether certain platforms, modes of engagement, or appearance-focused content environments are more strongly associated with oral health-related psychosocial responses. We explicitly highlight this as the most consequential limitation of the present design. Using two single-item, parent-reported indicators for the focal moderator constrains how strongly we can interpret the active versus passive contrast: it cannot capture the marketing-mediated character of the exposure (e.g., influencer versus peer content, sponsored versus organic posts, smile-focused versus non-appearance content), and it cannot distinguish reciprocal active engagement from performative appearance posting. Replication efforts should treat social media use as a multi-construct exposure, ideally with validated multi-item scales such as the Passive and Active Facebook use measure and the social media activity questionnaire, platform-stratified items, intensity/problematic-use measures, and behavioral traces, before the moderation pattern observed here is taken as a stable health marketing finding (Andreassen et al., 2017; Gerson et al., 2017; Orosz et al., 2016; Ozimek et al., 2023).

Finally, the study is situated within a specific oral-health and adolescent context, which may limit broader generalizability. Beyond methodological extension, the most productive next steps are theory-driven. First, future work should test whether appearance as health-related market value generalizes to other visible health domains, such as dermatology, weight management, cosmetic dentistry, and hair restoration. Second, platform-governance research should examine whether algorithmic curation differentially exposes vulnerable consumer segments to value-destroying appearance content, and whether interventions such as down-ranking, content labels, or age-gated affordances alter these patterns. Third, consumer-vulnerability research should use longitudinal designs to distinguish situational vulnerability during developmental sensitivity windows from more stable vulnerability, building on the orthodontic paradox observed here (Haidt, 2024; Orben & Przybylski, 2019; Orben et al., 2022). These directions move beyond cataloguing further psychosocial correlates and towards a generative health marketing theory of marketing-mediated health value, vulnerability, and co-destruction.

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Ethics statement

This study survey received ethical approval from the University of Otago Human Ethics Committee (21/089 UOHEC). Approval date August 05, 2021.

Consent statement

Data were collected via members of a New Zealand paid research panel (<https://www.dynata.com/>), from a paired parent-child subset of their research groups. Parent/guardian consent was obtained to take part in this study.

Author contributions

All authors contributed substantially to the conception and design of the study, the acquisition, analysis and interpretation of data, critically revised the manuscript for important intellectual content, approved the final version for submission, and agree to be accountable for all aspects of the work.

Khaled Ibrahim: conceptualization; methodology; software; data curation; formal analysis; investigation; visualization; project administration; resources; writing - original draft; writing - review & editing.

Lisa S. McNeill: conceptualization; methodology; investigation; validation; supervision; funding acquisition; resources; writing - original draft; writing - review & editing.

Li Mei: conceptualization; methodology; investigation; validation; supervision; funding acquisition; resources; writing - original draft; writing - review & editing.

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Writing - review & editing	Khaled Ibrahim, Lisa S. McNeill, Li Mei

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

References

- Abbasi, M. S., Lal, A., Das, G., Salman, F., Akram, A., Ahmed, A. R., Maqsood, A., & Ahmed, N. (2022). Impact of social media on aesthetic dentistry: General practitioners' perspectives. *Healthcare*, 10(10), 2055. <https://doi.org/10.3390/healthcare10102055>
- Ahmed, O., Siddiqua, S. J. N., Alam, N., & Griffiths, M. D. (2021). The mediating role of problematic social media use in the relationship between social avoidance/distress and self-esteem. *Technology in Society*, 64, 101485. <https://doi.org/10.1016/j.techsoc.2020.101485>
- Andreassen, C. S., Pallesen, S., & Griffiths, M. D. (2017). The relationship between addictive use of social media, narcissism, and self-esteem: Findings from a large national survey. *Addictive Behaviors*, 64, 287–293. <https://doi.org/10.1016/j.addbeh.2016.03.006>
- Appel, H., Gerlach, A. L., & Crusius, J. (2016). The interplay between Facebook use, social comparison, envy, and depression. *Current Opinion in Psychology*, 9, 44–49. <https://doi.org/10.1016/j.copsyc.2015.10.006>
- Bai, X., Lan, C., Li, J., Zhou, Y., Zhou, L., & Gao, X. (2025). Memory biases in problematic social media use: The impact of attachment insecurity. *Social Science & Medicine* (1982), 382, 118410. <https://doi.org/10.1016/j.socscimed.2025.118410>
- Büchi, M. (2024). Digital well-being theory and research. *New Media & Society*, 26(1), 172–189. <https://doi.org/10.1177/14614448211056851>
- Butt, I., Iqbal, T., & Zohaib, S. (2019). Healthcare marketing: A review of the literature based on citation analysis. *Health Marketing Quarterly*, 36(4), 271–290. <https://doi.org/10.1080/07359683.2019.1680120>
- Coyne, S. M., Rogers, A. A., Zurcher, J. D., Stockdale, L., & Booth, M. (2020). Does time spent using social media impact mental health? An eight-year longitudinal study. *Computers in Human Behavior*, 104, 106160. <https://doi.org/10.1016/j.chb.2019.106160>
- de Jong-Lenters, M., Duijster, D., Bruist, M. A., Thijssen, J., & de Ruiter, C. (2014). The relationship between parenting, family interaction and childhood dental caries: A case-control study. *Social Science & Medicine* (1982), 116, 49–55. <https://doi.org/10.1016/j.socscimed.2014.06.031>
- Elhajjar, S., & Ouaida, F. (2022). Use of social media in healthcare. *Health Marketing Quarterly*, 39(2), 173–190. <https://doi.org/10.1080/07359683.2021.2017389>

- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook “friends”: Social capital and college students’ use of online social network sites. *Journal of Computer-Mediated Communication*, 12(4), 1143–1168. <https://doi.org/10.1111/j.1083-6101.2007.00367.x>
- Falk, R. F., & Miller, N. B. (1992). *A primer for soft modeling*. University of Akron Press.
- Fernández-Cevallos, A. D., Ribas-Perez, D., Arenas-González, M., Elkhoury-Moreno, L., Torrejón-Martínez, J., Rosel-Gallardo, E., & Castaño-Seiquer, A. L. (2025). Impact of dental aesthetics on self-esteem in students at the Polígono Sur education permanent center in Seville, Spain. *Scientific Reports*, 15(1), 15550. <https://doi.org/10.1038/s41598-025-00545-x>
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7(2), 117–140. <https://doi.org/10.1177/001872675400700>
- Freire, Y., Gómez Sánchez, M., Sánchez Ituarte, J., Frías Senande, M., Díaz-Flores García, V., & Suárez, A. (2024). Social media impact on students’ decision-making regarding aesthetic dental treatments based on cross-sectional survey data. *Scientific Reports*, 14(1), 21626. <https://doi.org/10.1038/s41598-024-72442-8>
- Gerson, J., Plagnol, A. C., & Corr, P. J. (2017). Passive and active Facebook use measure (PAUM): Validation and relationship to the reinforcement sensitivity theory. *Personality and Individual Differences*, 117, 81–90. <https://doi.org/10.1016/j.paid.2017.05.034>
- Haidt, J. (2024). *The anxious generation: How the great rewiring of childhood is causing an epidemic of mental illness*. Penguin Press.
- Hair, J. F., Jr., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE.
- Hair, J. F., Jr., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, 26(2), 106–121. <https://doi.org/10.1108/EBR-10-2013-0128>
- Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review*, 94(3), 319–340. <https://doi.org/10.1037/0033-295X.94.3.319>
- Higgins, E. T. (1989). Self-discrepancy theory: What patterns of self-beliefs cause people to suffer? *Advances in Experimental Social Psychology*, 22, 93–136. [https://doi.org/10.1016/S0065-2601\(08\)60306-8](https://doi.org/10.1016/S0065-2601(08)60306-8)
- Huang, C. (2017). Time spent on social network sites and psychological well-being: A meta-analysis. *Cyberpsychology, Behavior and Social Networking*, 20(6), 346–354. <https://doi.org/10.1089/cyber.2016.0758>
- Klages, U., Claus, N., Wehrbein, H., & Zentner, A. (2006). Development of a questionnaire for assessment of the psychosocial impact of dental aesthetics in young adults. *European Journal of Orthodontics*, 28(2), 103–111. <https://doi.org/10.1093/ejo/cji083>
- Kock, N. (2017). Common method bias: A full collinearity assessment method for PLS-SEM. In H. Latan & R. Noonan (Eds.), *Partial least squares path modeling* (pp. 245–257). Springer. https://doi.org/10.1007/978-3-319-64069-3_11
- Kolawole, K. A., Ayeni, O. O., & Osiatuma, V. I. (2012). Psychosocial impact of dental aesthetics among university undergraduates. *International Orthodontics*, 10(1), 96–109. <https://doi.org/10.1016/j.ortho.2011.12.003>
- Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D. S., Lin, N., Shablack, H., Jonides, J., & Ybarra, O. (2013). Facebook use predicts declines in subjective well-being in young adults. *PLoS One*, 8(8), e69841. <https://doi.org/10.1371/journal.pone.0069841>
- Liengaard, B. D., Sharma, P. N., Hult, G. T. M., Jensen, M. B., Sarstedt, M., Hair, J. F., & Ringle, C. M. (2021). Prediction: Coveted, yet forsaken? Introducing a cross-validated predictive ability test in partial least squares path modeling. *Decision Sciences*, 52(2), 362–392. <https://doi.org/10.1111/deci.12445>
- Mader, S., Costantini, D., Fahr, A., & Delgrande Jordan, M. (2025). The effect of social media use on adolescents’ subjective well-being: Longitudinal evidence from Switzerland. *Social Science & Medicine* (1982), 365, 117595. <https://doi.org/10.1016/j.socscimed.2024.117595>
- Marino, C., Gini, G., Vieno, A., & Spada, M. M. (2018). The associations between problematic Facebook use, psychological distress and well-being among adolescents and young adults: A systematic review and meta-analysis. *Journal of Affective Disorders*, 226, 274–281. <https://doi.org/10.1016/j.jad.2017.10.007>
- Meier, A., & Reinecke, L. (2021). Computer-mediated communication, social media, and mental health: A conceptual and empirical meta-review. *Communication Research*, 48(8), 1182–1209. <https://doi.org/10.1177/0093650220958224>
- Orben, A., & Blakemore, S.-J. (2023). How social media affects teen mental health: A missing link. *Nature*, 614(7948), 410–412. <https://doi.org/10.1038/d41586-023-00402-9>
- Orben, A., & Przybylski, A. K. (2019). The association between adolescent well-being and digital technology use. *Nature Human Behaviour*, 3(2), 173–182. <https://doi.org/10.1038/s41562-018-0506-1>
- Orben, A., Przybylski, A. K., Blakemore, S.-J., & Kievit, R. A. (2022). Windows of developmental sensitivity to social media. *Nature Communications*, 13(1), 1649. <https://doi.org/10.1038/s41467-022-29296-3>
- Orosz, G., Tóth-Király, I., & Bóthe, B. (2016). Four facets of Facebook intensity: The development of the multidimensional Facebook intensity scale. *Personality and Individual Differences*, 100, 95–104. <https://doi.org/10.1016/j.paid.2015.11.038>

- Ozimek, P., Brailovskaia, J., & Bierhoff, H.-W. (2023). Active and passive behavior in social media: Validating the Social Media Activity Questionnaire (SMAQ). *Telematics and Informatics Reports*, 10, 100048. <https://doi.org/10.1016/j.teler.2023.100048>
- Park, H., Rodgers, S., McElroy, J. A., & Everett, K. (2018). Sexual and gender minority social media user characteristics: Examining preferred health information. *Health Marketing Quarterly*, 35(1), 1–17. <https://doi.org/10.1080/07359683.2017.1310553>
- Parkinson, J., & Davey, J. (2021). Meeting of the minds: Research priorities for value co-creation in dialogical conferences. *Journal of Services Marketing*, 35(4), 401–411. <https://doi.org/10.1108/JSM-06-2020-0207>
- Parkinson, J., & Davey, J. (2023). The importance of health marketing and a research agenda. *Health Marketing Quarterly*, 40(4), 347–351. <https://doi.org/10.1080/07359683.2024.2271780>
- Parkinson, J., & Naidu, J. (2024). Driving and evaluating social impact in health marketing. *Health marketing quarterly*, 41(2), 113–129. <https://doi.org/10.1080/07359683.2024.2363568>
- Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, 63(1), 539–569. <https://doi.org/10.1146/annurev-psych-120710-100452>
- Richter, J. P., & Kazley, A. S. (2020). Social media: How hospital Facebook activity may influence patient satisfaction. *Health Marketing Quarterly*, 37(1), 1–9. <https://doi.org/10.1080/07359683.2020.1713573>
- Rossiter, J. R. (2002). The C-OAR-SE procedure for scale development in marketing. *International Journal of Research in Marketing*, 19(4), 305–335. [https://doi.org/10.1016/S0167-8116\(02\)00097-6](https://doi.org/10.1016/S0167-8116(02)00097-6)
- Sharma, P. N., Liengard, B. D., Hair, J. F., Sarstedt, M., & Ringle, C. M. (2023). Predictive model assessment and selection in composite-based modeling using PLS-SEM: Extensions and guidelines for using CVPAT. *European Journal of Marketing*, 57(6), 1662–1677. <https://doi.org/10.1108/EJM-08-2020-0636>
- Taibah, S. M., & Al-Hummayani, F. M. (2017). Effect of malocclusion on the self-esteem of adolescents. *Journal of Orthodontic Science*, 6(4), 123–128. https://doi.org/10.4103/jos.JOS_16_17
- Valkenburg, P. M., Meier, A., & Beyens, I. (2022). Social media use and its impact on adolescent mental health: An umbrella review of the evidence. *Current Opinion in Psychology*, 44, 58–68. <https://doi.org/10.1016/j.copsyc.2021.08.017>
- Verduyn, P., Gugushvili, N., & Kross, E. (2022). Do social networking sites influence well-being? The extended active–passive model. *Current Directions in Psychological Science*, 31(1), 62–68. <https://doi.org/10.1177/09637214211053637>
- Verduyn, P., Lee, D. S., Park, J., Shablack, H., Orvell, A., Bayer, J., Ybarra, O., Jonides, J., & Kross, E. (2015). Passive Facebook usage undermines affective well-being: Experimental and longitudinal evidence. *Journal of Experimental Psychology. General*, 144(2), 480–488. <https://doi.org/10.1037/xge0000057>
- Verduyn, P., Ybarra, O., Résibois, M., Jonides, J., & Kross, E. (2017). Do social network sites enhance or undermine subjective well-being? A critical review. *Social Issues and Policy Review*, 11(1), 274–302. <https://doi.org/10.1111/sipr.12033>
- Vidal, C., Lhaksampa, T., Miller, L., & Platt, R. (2020). Social media use and depression in adolescents: A scoping review. *International Review of Psychiatry*, 32(3), 235–253. <https://doi.org/10.1080/09540261.2020.1720623>
- Vogel, E. A., & Rose, J. P. (2016). Self-reflection and interpersonal connection: Making the most of self-presentation on social media. *Translational Issues in Psychological Science*, 2(3), 294–302. <https://doi.org/10.1037/tps0000076>
- Weingott, S., & Parkinson, J. (2025). The application of artificial intelligence in health communication development: A scoping review. *Health Marketing Quarterly*, 42(1), 67–109. <https://doi.org/10.1080/07359683.2024.2422206>
- Wood, J. V. (1989). Theory and research concerning social comparisons of personal attributes. *Psychological Bulletin*, 106(2), 231–248. <https://doi.org/10.1037/0033-2909.106.2.231>