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Extending the SOR Model: Social Media, Health Consciousness, and Cultural Influences on Sugar Reduction Behavior in Chinese Youth

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Submitted to: Journal of Medical Internet Research
on: November 01, 2024

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Abstract

Background: With the rising prevalence of sugar-related diseases such as obesity and diabetes, there is an increasing emphasis on reducing sugar intake, particularly among youth. In China, social media is playing an increasingly significant role in shaping health behaviors, including habits related to sugar consumption, as the trend of sugar reduction has become a prominent movement among the youth.

Objective: This study extends the SOR model by incorporating the distinct cultural influence of "face" to investigate the impact of social media on sugar reduction behaviors among Chinese youth, as well as the mediating role of health consciousness and conformity, and the moderating effects of face concern and eHealth literacy.

Methods: A national web-based cross-sectional survey was conducted by a proportionate probability sampling among 883 Chinese youth in July 2024., Descriptive statistics, Pearson correlations, Model fit indices and PLS (Partial Least Squares) SEM were employed to examine and explore the relationships among all the variables.

Results: Nearly half the 883 participants were female (460/883, 52.1%), 91.9% (812/883)of the sample ages fall within the 15-30 range. Most of the participants (602/883, 68.2%) had undergraduate education levels; the majority of participants (688/883, 77.9%) had a bachelor's degree or higher, and a normal Body Mass Index (BMI) (654/883, 74.1%). Most had been using social media for between 3 to 10 years (575/883); 74.1%. The statistics reveal that Chinese youth have demonstrated a relatively high score in sugar reduction behaviors(mean score 3.621/5, SD 0.990). Male participants achieved notably higher scores in sugar reduction behaviors.(mean score 3.725/5, SD 0.933), Participants at the age of 15-18 showed significantly lower sugar reduction behavior scores(mean score 3.508/5, SD 1.052). Structural equation modeling revealed that social media usage positively influenced conformity (?=.51, p<.001) and health consciousness (?=.353, p<.001), which in turn significantly predicted sugar reduction behaviors (?=.139 and ?=.498, respectively, p<.001). The influence of social media usage on sugar reduction behaviors is primarily facilitated through two mediating pathways.Health consciousness mediated the relationship between social media usage and sugar reduction behaviors (VAF=51.5%), while conformity's mediation was less pronounced (VAF=21.05%), indicating a secondary influence. Face concern (?=0.089, p=.02) and eHealth literacy (?=0.055, p=.04) moderated the respective relationships.

Conclusions: This study demonstrates that social media effectively promotes sugar reduction behaviors among Chinese youth. By integrating cultural factors like face concern and eHealth literacy into an extended SOR model, we enhance our understanding of social media's influence on health behaviors. The findings underscore the importance of cultural nuances in health communication and establish the enhanced SOR model as a valuable framework for health promotion strategies. Furthermore, the study highlights the mediating role of health consciousness and the moderating effects of face concern and eHealth literacy, providing actionable insights for public health initiatives in the digital age.

(JMIR Preprints 01/11/2024:68180)

DOI: https://doi.org/10.2196/preprints.68180

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is primarily facilitated through two mediating pathways.Health consciousness mediated the relationship between social media usage and sugar reduction behaviors (VAF=51.5%), while conformity's mediation was less pronounced (VAF=21.05%), indicating a secondary influence. Face concern (β=0.089, p=.02) and eHealth literacy (β=0.055, p=.04) moderated the respective relationships.

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Keywords: social media usage; sugar reduction behaviors; conformity; health consciousness; face concern; eHealth literacy; health promotion

Introduction

The World Health Organization [Error: Reference source not found] highlighted in its 2022 *Global Status Report on Physical Activity* that nearly half a billion people worldwide will be affected by obesity, diabetes, heart disease, or other non-communicable diseases between 2020 and 2030. These alarming figures emphasize the urgent need for global health interventions. Reducing sugar intake has become a crucial measure for improving public health and enhancing the quality of life, particularly among youth. In China, one of the largest sugar-importing nations[①] [Error: Reference source not found] with the highest number of diabetes patients[②] [Error: Reference source not found], the trend toward sugar reducing has gained significant traction among young population, where "sugar-free" is more appealing than the traditional Chinese "nourishing food as medicine" philosophy. Market for low-sugar products in China is continuously refreshed and is gaining immense popularity, with The trend of sugar reduction behaviors is gaining ground. For collective behaviors such as the sugar reduction trend, understanding these kind of phenomena demands a dual focus on culture influence and collective behavioral patterns [Error: Reference source not found,Error: Reference source not found,Error: Reference source not found]. In this sense, although several studies have explored the impact of social media on health behaviors, acknowledging the potential of social media to foster health behavior among youth [Error: Reference source not found,Error: Reference source not found], theoretical exploration into health behavior change within social media contexts is notably lacking [Error: Reference source not found], the specific mechanisms by which social media influences users' health behaviors remain obscure, resulting in a deficient theoretical framework for practical application [Error: Reference source not found].

Current research primarily focuses on Western contexts where individualism is dominant, while in Chinese culture, the concept of "face" plays a crucial role in shaping individual and collective behavior, particularly in social interactions. The concern of "face" guides individuals to conform to societal norms to avoid public criticism or embarrassment. When individuals recognize the existence of the "sugar reduction" trend, conforming to it and "performing" within it becomes a behavior that

[①]China Building Materials Circulation Association (CFLP). (September 4, 2023). In-depth Report on the Sugar Industry. China Building Materials Circulation Association Official Website. http://www.cbca.org.cn/news/ztbd/2023-09-04/e07225c1288a065238e2ecf3ee738f37.html

[②] NewTide. (2021). *Young people on the road to controlling blood sugar* .Retrieved from November 5 2021, form https://www.thepaper.cn/newsDetail_forward_15380269

enhances their face both online and offline. In this context, China's distinctive face culture highlights the interplay between individual cognition and group behavior through the lens of conformity. In light of this, our study aims to extend the SOR model by integrating face culture as a moderating factor, investigating how this cultural aspect amplifies conformity, health consciousness, and behaviors in the context of the sugar reduction trend. This augmentation of the SOR model highlights the necessity of incorporating cultural differences into the study of health behaviors influenced by social media.

Theoretical Framework and Research Hypothesis

Theoretical Framework

The Stimulus-Organism-Response (S-O-R) framework, as proposed by Mehrabian and Russell [Error: Reference source not found] delineates and elucidates the process by which individuals react to external stimuli. It includes three core components: Stimulus, which refers to external information or events perceptible by the senses; Organism, encompassing the individual's intrinsic qualities such as psychological, emotional, cognitive, and physiological aspects; and Response, which includes not only observable behavioral changes but also emotional and cognitive adjustments. This theoretical framework suggests that environmental and informational prompts (S) can provoke cognitive and affective reactions (O) from the audience in response to these stimuli, which in turn can impact the behavior of individuals(R) [Error: Reference source not found,Error: Reference source not found]. , and has been extensively applied in various fields such as consumer behavior analysis, health promotion strategies, evaluation of educational intervention outcomes, and research on social media and health communication [Error: Reference source not found,Error: Reference source not found,Error: Reference source not found ,Error: Reference source not found,Error: Reference source not found,Error: Reference source not found]. This study adheres to precedents by employing the S-O-R model to depict the impact of youth's social media usage on sugar reduction behaviors. The health information related to sugar reduction, educational content, peer sharing and discussions, and advice from health influencers posted on social media platforms constitute the informational cues and external stimuli (S). As individuals with the capacity for independent thinking and decision-making, the intrinsic characteristics of the youth, such as their level of knowledge, attitudes, beliefs, values, and self-efficacy, determine how they perceive, interpret, and process health information on social media, representing the "organism"(O). Concurrently, consumer purchasing behavior [Error: Reference source not found], health management behavior [Error: Reference source not found] and personal psychological states [Error: Reference source not found] can change due to environmental factors. Young individuals may exhibit shifts in health consciousness, attitudes, and beliefs based on their interpretation of social media stimuli, leading to modifications in health promotion behaviors(R).

Hence, for this study, the extension of SOR model presents considerable theoretical merits in scrutinizing the interplay between social media usage and sugar reduction behaviors among young Chinese demographics. At the forefront, the model's systematic framework explicitly traces a direct line from stimulus to reaction, aiding in the precise ascertainment of how social media information influences sugar reduction behaviors. Additionally, it emphasizes the pivotal mediating role of internal psychological states like the propensity for conformity and health consciousness between stimuli and reactions, supplying theoretical scaffolding for grasping how individuals develop sugar reduction behaviors under societal sway. Subsequently, the SOR model contemplates the role of cultural factors affecting stimuli, the organism, and reactions, which is fundamental for understanding the dynamics of social media usage and health behaviors

within diverse cultural settings. Furthermore, the model's interdisciplinary synthesis, integrating areas such as psychology, communication studies, public health, and information technology, furnishes a holistic lens for the investigation. Ultimately, its theoretical adaptability enables it to merge with other theories to build more sophisticated and all-encompassing frameworks, profoundly elucidating the complex dynamics between social media engagement and sugar reduction behaviors. These benefits endow the SOR model with practical utility in the arena of health intervention strategy design and execution.

Research Question and Hypothesis

The concept of health promotion aligns with the ancient Chinese philosophy of "yangsheng(nourishing one's life)", yet there are intrinsic differences. In China, "yangsheng" is more about harmonizing the self with nature and society, whereas Western approaches tend to emphasize individual health enhancement and lifespan extension through scientific techniques. In Chinese traditional views, "yangsheng" is predominantly a preference of middle-aged and elderly people, but in recent years, an increasing number of young people have begun to value "yangsheng" [Error: Reference source not found], a phenomenon clearly distinct from the health concerns and behaviors of the older demographic. Young individuals generally lack disease knowledge and experience, a gap may stem from their limited exposure to illnesses, affecting their comprehension and application of health information [Error: Reference source not found]. Moreover, the lack of disease experience may lead to difficulties in information evaluation and selection [Error: Reference source not found], insufficient perception of disease threat, leading to the inability to form clear health attitudes and beliefs [Error: Reference source not found]. In this context, once confronted with health-related issues or decisions, young people may conformingly adopt the views and choices propagated by various social media users, especially with the proliferation of health information on Chinese social media platforms in recent years [Error: Reference source not found], the widespread application of social media in the healthcare [Error: Reference source not found], and a strong collective culture that emphasizes group goals and interpersonal harmony, leading to increased conformity [Error: Reference source not found]. Therefore, the conformity of Chinese youth in the social media provides an attractive explanation for the trend of sugar reduction. Of course, beyond the short-term conformity, the long-term immersion in social media information may also subtly enhance users' health consciousness, thereby influencing health behaviors [Error: Reference source not found]. Consequently, the conformity in social media environment and the enhancement of health consciousness could be two interconnected parallel paths. Thus, the research Questions are as follows:

- *RQ1: Does the trend of sugar reduction among young Chinese youth stem from conformist decision-making under the influence of social media, or is it an outcome of an enhanced health consciousness nurtured by prolonged exposure to the social media landscape? Should there be an interplay between the two, which factor takes the lead?*

- *RQ2：Does the sugar reduction behavior of Chinese youth exhibit any distinctive influences and mechanisms specific to the Eastern cultural backdrop?*

The new generation of China exhibits health perspectives differ from the elderly, a transformation intricately linked to the potent force of change among the youth—social media [Error: Reference source not found], which shapes the informational environment in which

individuals make conformist choices. This can manifest as informational social influence [Error: Reference source not found], where individuals rely on the opinions of others to form their own opinions and behaviors when faced with uncertain or unfamiliar situations [Error: Reference source not found]. Despite the youth's proficiency in obtaining health information online, the lack of direct disease experience leads to limited comprehension of health knowledge and difficulties in information assessment and selection [Error: Reference source not found], resulting in greater reliance on user-generated content on social media [Error: Reference source not found], being swayed by the information shared by online opinion leaders [Error: Reference source not found], seeking inspiration for health and lifestyle from social media influencers and subsequently shaping their health concepts and behaviors [Error: Reference source not found]. On the other hand, the youth are more susceptible to the influence of a sense of belonging and identity [Error: Reference source not found], which is the phenomenon where individuals alter their behavior to conform to the expectations of others in the face of social norms and group pressures to gain approval and avoid rejection [Error: Reference source not found]. They are more easily swayed by the number of likes from peers on social media, thereby garnering virtual peer approval [Error: Reference source not found] and a sense of belonging [Error: Reference source not found]. Nowadays, Social media has become a key catalyst for changing users' perceptions of social norms, with collective online actions potentially reshaping their understanding and influencing their behavior [Error: Reference source not found,Error: Reference source not found]. Therefore, the following research hypotheses are proposed:

- *H1:Social media usage positively predicts conformity.*

We attempt to introduce distinct cultural elements of China to substantiate the nuanced mechanisms behind the conformity stemming from the prevalence of social media in China. Shaped by Confucianism, the concept of "face" has been a distinctive cultural practice in China’s history [Error: Reference source not found,Error: Reference source not found], the spread of social media has offered a new platform for the manifestation of "face" culture in the digital realm. Behaviors such as the pursuit of online influence and attention, maintenance of online relationships and social status, and the display of personal image and life conditions have become crucial ways for individuals to maintain their digital face [Error: Reference source not found,Error: Reference source not found,Error: Reference source not found]. As individuals become more deeply engaged with social media, their integration into online social networks grows, and they come to value the validation and praise they receive within these communities. Consequently, they are more likely to develop a heightened conformist tendency, embracing behaviors that align with the collective consensus, trends, or standards of their social circles. This dynamic helps to preserve the "interdependence among group members,"[Error: Reference source not found]. When one become cognizant of the dominant "sugar-reduction" trend, conforming to and visibly participating in this trend both online and offline becomes an esteemed "face-giving" behavior. Hence, in China, "face concern" can be regarded as a catalyst for the conformist effect under social media, and the stronger the face concern, the greater the impact of social media usage on conformist choices. Therefore, Hypothesis H1a is proposed:

- *H1a: Face concern plays a moderating role between social media usage and conformity.*

Though few studies have specifically examined the impact of conformity on sugar reduction behavior, classic studies such as the Asch experiment, the Milgram experiment, and social identity theory [Error: Reference source not found] have all confirmed the potential influence of conformity on cognition and behavior. Individuals may adjust their behavior to align with group

expectations and gain social recognition due to perceived authority or social norms. Social media then becomes an essential tool for accelerating the formation and dissemination of social norms [Error: Reference source not found], and it fosters the development and reinforcement of users' subjective norms [Error: Reference source not found]. Such normative impact creates a context that induces conformity [Error: Reference source not found]. From the perspective of the Theory of Planned Behavior, one's intentions to act are shaped by attitudes, perceived social pressures, and perceived behavioral control. This means that as a reflection of China's societal health trends online, social media can catalyze the emphasis on health into a social norm, which encourage users to choose healthy behaviors. Studies show that youth nutrition consumption is driven by social "trending," novelty-seeking, and entertainment, heavily swayed by influencers and social groups, resulting in over 58.94% making spontaneous purchases based on health influencer endorsements [Error: Reference source not found]. De Vere Hunt and Linos [Error: Reference source not found] suggest that social media can encourage changes in health behaviors, such as fat reduction and low-calorie diets. A study specific to China also found a significant correlation between social media usage and preferences for fat reduction and low-calorie diets [Error: Reference source not found]. As a specific manifestation of health promotion, sugar reduction may also be influenced by social media, leading to the following hypothesis.

- *H2: Social media usage positively influences sugar reduction behaviors.*

- *H3: Conformity serves as a mediator between social media usage and sugar reduction behaviors.*

Beyond the conformity effect, prolonged exposure to social media may also influence users' health consciousness, thereby leading to sugar reduction behaviors. According to Gould [Error: Reference source not found], health consciousness is anchored in an individual's subjective perspective on health. It involves recognizing one's health status and includes dimensions such as health self-awareness, vigilance regarding health issues, self-monitoring of health, and active engagement in health-related activities. Nowadays, Social media has became a vital platform for young people to actively or passively acquire health information [Error: Reference source not found], and its abundant health educational resources along with efficient dissemination not only allow users to easily access information about health and disease management, but also the sharing of others' health experiences and lifestyles on social media helps users effectively enhance their self-health consciousness and engagement [Error: Reference source not found]. The array of health apps on social media can record, track, and analyze health-related data such as exercise, diet, and disease monitoring, thereby helping users identify potential health issues and increase health vigilance [Error: Reference source not found], Sinha & Sahu [Error: Reference source not found] note the potential of social media in enhancing health consciousness, thus indicating that active use of social media can strengthen an individual's health consciousness. Furthermore, Empirical research indicates that heightened health consciousness leads to advancements in various aspects of health behavior [Error: Reference source not found,Error: Reference source not found,Error: Reference source not found,Error: Reference source not found,Error: Reference source not found]. Health behaviors that involve reducing sugar, as a method of health advancement, are also positively impacted by health consciousness. This is evident as young individuals actively search for and engage with health, fitness, and wellness influencers, specialists, and groups to enhance their health consciousness, thus encouraging personal health behaviors that reduce sugar intake. On the flip side, the unchecked dissemination of social media content [Error: Reference source not found] coupled with intensive promotion of sugary products [Error: Reference source not found,Error: Reference

source not found] may cultivate erroneous health beliefs among young individuals, leading to dietary patterns that can negatively impact health and elevate the risks of conditions like obesity, high blood pressure, and type 2 diabetes [Error: Reference source not found]. In light of the aforementioned findings, the subsequent hypotheses are formulated:

- *H4: Social media usage positively influences health consciousness.*
- *H5: Health consciousness positively influences sugar reduction behaviors.*
- *H6: Health consciousness mediates the relationship between social media usage and sugar reduction behavior.*

Notably, the transition from health consciousness to sugar-reducing behaviors is not automatic among individuals with diverse traits; this process is substantially directed by an individual's cognitive and capability factors. Within the era of digital information, eHealth literacy—the capacity to locate, comprehend, and evaluate health information via digital platforms and to utilize such information to manage and resolve personal health concerns [Error: Reference source not found]—is gaining significance alongside the rising frequency with which youth seek health-related content on social media [Error: Reference source not found]. Norman and Skinner [Error: Reference source not found] proposed that eHealth literacy allows individuals to efficiently seek out, evaluate, understand, and refine their health decision-making processes and applications. This suggests that those possessing high levels of eHealth literacy are more inclined to convert their health consciousness into specific health behaviors, such as sugar reduction behaviors. Research supports this notion, Bodie [Error: Reference source not found] indicates that eHealth literacy significantly impacts an individual's health and behavior. Individuals with higher eHealth literacy exhibit better performance in health behaviors, such as self-care and medication adherence, as well as in health knowledge, health decision-making [Error: Reference source not found], and health-related quality of life [Error: Reference source not found]. It can be deduced that elevated eHealth literacy allows individuals to proficiently seek out, evaluate, understand, and enhance their consciousness regarding low-sugar health, which in turn stimulates a more vigorous inclination to embrace behaviors aimed at reducing sugar intake. Thus, we conclude that:

- *H5a: eHealth literacy plays a moderating role between health consciousness and sugar reduction behavior.*

Moreover, It cannot be ignored that conformity within social media contexts might also contribute to the improvement of users' health consciousness. Rimal & Rea [Error: Reference source not found]suggest that social media influences health consciousness and behavioral intentions by communicating the descriptive norms (the commonality of behaviors) and the normative standards (the anticipated behaviors by others) related to healthy actions. When social media portrays healthy behaviors as common and accepted, users may elevate their health consciousness due to the conformity effect. As one of the key factors influencing adolescents' Unhealthy dietary behaviors [Error: Reference source not found], With social media's broad reach potentially exposing users to a wider array of social norms that can impact dietary habits and possibly affect Body Mass Index (BMI), as indicated by Hawkins [Error: Reference source not found], the proposition of Hypothesis H6 and H7 arises. Synthesizing Hypotheses H1 through H6, we might infer a sequential mediating effect of conformity and health consciousness between social media usage and the sugar reduction behaviors, leading to Hypothesis H7a.

- *H7: Conformity positively influence health consciousness.*

- *H8: Conformity and health consciousness exert a chain mediating effect between social media usage and sugar reduction behaviors among Chinese youth.*

Drawing on the aforementioned analysis, this study applies the SOR framework, with social media usage as the Stimulus, and Conformity and health consciousness under the influence of social media as the collective Organism state of the audience, and sugar reduction behavior as the Response, to analyze the intrinsic mechanisms of the sugar reduction trend among Chinese youth; and to investigate the moderating effects of Face concern and eHealth literacy within this mechanism, as illustrated in Figure1

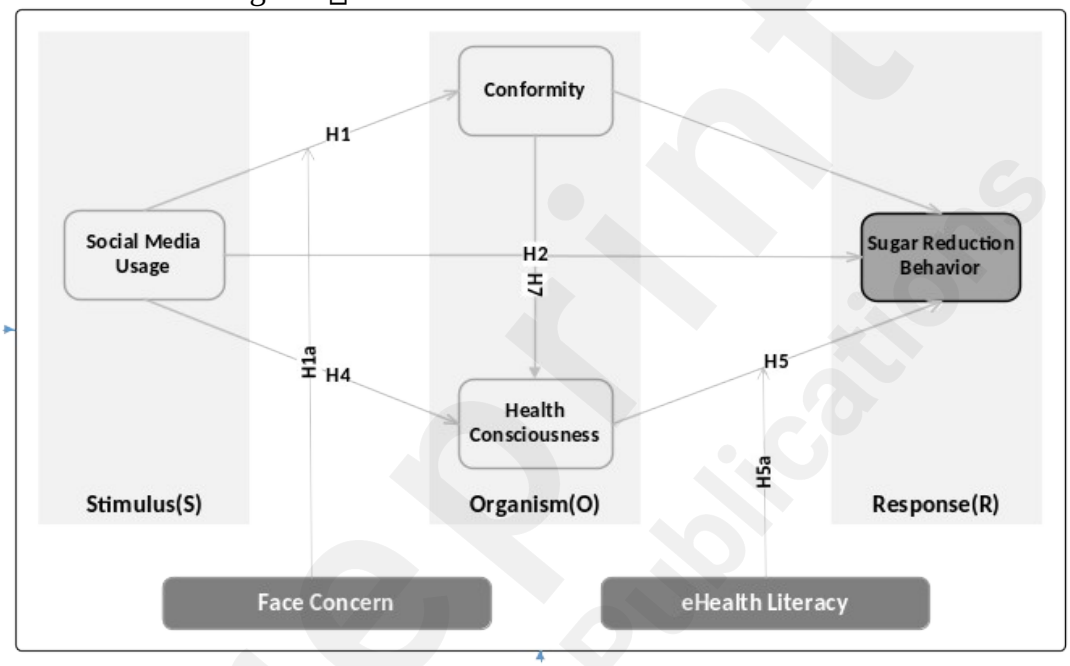

Figure 1. Conceptual Model and research hypotheses

Methods

Design and Recruitment

Our study focus on Chinese youth, WHO categorizes youth as ages 15-44[③], the EU as 18-35[④], and National Bureau of Statistics of China as 15-34[⑤]. This study adopts a definition of youth as 15-35 years old, with a corresponding questionnaire filter. Considering budget constraints, feasibility, and sample accessibility, online sampling is chosen as the most practical method. However, this method has inherent selection bias, which may lead to overrepresentation or underrepresentation of certain groups. Young people from specific provinces may be more actively involved in or have easier access to the survey, this approach carries an inherent risk of selection bias, potentially resulting in an over- or under-representation of certain demographic groups, it is possible that individuals from certain provinces are more likely to engage with or have greater accessibility to the survey, which could introduce regional skew and compromise the precision of SEM analyses, as well as the applicability of the findings. To address these issues, we implemented a dual strategy of stratified and online sampling supported by the

[③] World Health Organization. (2015). Health for the world's adolescents: A second chance in the second decade. Geneva: World Health Organization.
[④] European Commission. (2020). Erasmus+: The EU programme promoting learning, training and development opportunities. Luxembourg: Publications Office of the European Union.
[⑤] National Bureau of Statistics of China. (2021). China Statistical Yearbook on Population and Employment — 2021. China Statistical Publishing House. https://www.stats.gov.cn/zs/tjwh/tjkw/tjzl/202302/t20230215_1908006.html

features of the Questionnaire Star platform, which is a leading Chinese online survey platform with a database of over 10 million high-quality, demographically diverse samples. The platform's capabilities enable the implementation of stratified random sampling to ensure that samples align with the target population across critical demographic traits like age, gender, education, and region. Additionally, quota sampling was established to further ensure the balance of the sample structure, utilizing the platform's random allocation feature ensures that all potential respondents have equal opportunities to participate. We also employed various channels like online platforms and social media to broaden sample coverage. Simultaneously, incentive measures such as small rewards were adopted to enhance response rates.

In response to self-report bias in survey research, several measures were implemented in the questionnaire. Firstly, a calibration scale was utilized by including the statement “Carbohydrates are one of the essential nutrients for the human body,” which helps identify respondents who may not be answering seriously or honestly. Secondly, Honesty Test Questions were incorporated, such as the statement “Sugar is a tasteless substance.” A respondent answering “true” may indicate potential dishonesty in their responses to other questions. Thirdly, logical consistency checks were employed by setting a related question to “I chose low-sugar food and beverages at least a few times in the past week,” asking, “During leisure activities, such as watching movies or reading, do I choose low-sugar drinks?” This approach ensures that respondents' answers remain logically consistent throughout the questionnaire. This paragraph maintains clarity and flow while effectively conveying the intended measures.

To meet the analytical requirements, the required sample size was estimated using the G*Power 3.1.9.7, employing ANOVA and t-tests between independent means. For the first calculation, one-way ANOVA was selected, with five groups, an effect size of 0.25, statistical power 1-β.95, and the probability of Type I error α at.05, resulting in a minimum total sample size of 305. For the second calculation, the t-test between independent means was chosen, with the same effect size and statistical power, and the allocation ratio set to 1, yielding a minimum total sample size of 834.

The initial data collection phase took place on June 20, 2024, with a preliminary survey yielding 172 responses from the Questionnaire Star platform, of which 144 were deemed valid. Following the evaluation of the questionnaire's reliability and validity, adjustments were made. The formal second phase of the survey was launched between July 8 and August 8, 2024, resulting in 1053 collected questionnaires. Excluding invalid responses based on calibration scale, honesty check, logical consistency check and response duration, 883 valid questionnaires were retained, achieving a valid response rate of 83.9%(883/1053), which satisfies the minimum sample size criteria mentioned earlier.

The demographic characteristics of the sample are shown in Table 1. It is noticeable that participants were predominantly aged 18to30 (803/883,90%), with a slight female preponderance (460,52.1%) over males (423,47.9%).The majority (688,78%) boasted a bachelor's degree or higher. An impressive (849,96%) had been engaged with social media for more than three years. The geographical spread showed a higher urban (567,64.2%) than rural (316,35.8%) representation. Regarding BMI, which is tied to sugar intake, the majority (654,74.1%) were of normal weight, and a small fraction (74,8.4%) were classified as overweight. In summary, the sample's demographic profile fits the study's demographic focus.

Table 1 Sociodemographic characteristics of our research sample(n=883)

Characteristics	n(%)
Gender	
Male	423(47.9)
Female	460(52.1)
Education	
Below junior high school level	7(0.8)
High school/secondary vocational education	108(12.2)
Junior college	80(9.1)
Undergraduate	602(68.2)
Postgraduate and above	86(9.7)
Age	
15-18	9(1.0)
18-24	577(65.3)
24-30	226(25.6)
30-35	71(8)
Professional background	
Liberal arts	400(45.3)
Science and engineering	483(54.7)
BMI	
Underweight(BMI<18.5)	155(17.5)
Normal weight (18.5≤BMI<24.9)	654(74.1)
Overweight(BMI≥25)	74(8.4)
Social media usage duration	
3 years or less	34(3.9)
3-5 years	274(31.0)
5-10 years	411(46.5)
over 10 years	164(18.6)
Family residence	
Countryside	316(35.8)
Cities and towns	567(64.2)

Measurement

The study utilized a 5-point Likert scale for all measurements, adapted from validated scales in current academic literature. To ensure cultural and linguistic appropriateness for Chinese respondents, a dual translation process was applied, involving translation from English to Chinese by bilingual experts and subsequent back-translation to verify accuracy and clarity.

Social media usage (SMU)

The social media usage (SMU) scale, consisting of six items[⑥], was adapted from the Social Networking Site Use Scale originally developed by Ellison et al. [Error: Reference source not found] .The original scale's context was adapted from Facebook to Chinese social media platforms, with items such as "Using social media is a part of my life" and "I spend most of my time on social media." Cronbach α=0.787, Mean 3.609, SD 0.668

Sugar reduction behavior（SRB）

[⑥] In Ellison et al.'s (2007) scale designed for Facebook users, the first two items pertain to the number of friends on social networks and daily usage time. Given the significant differences between the Chinese and American social media landscapes, with platforms like YouTube, TikTok, Instagram, and Snapchat being widely used by American youth—YouTube leading with a 93% usage rate—such metrics are not directly comparable to those of WeChat, which dominates the Chinese market and is deeply integrated into various aspects of daily life for Chinese residents. This renders the original items less valid for Chinese samples, hence this study utilizes the remaining six items of the scale, adapted to the Chinese context.

Considering that there is no established scale directly targeting sugar reduction behavior in existing literature, this article's measurement is based on the Health Promoting Lifestyle Profile-II (HPLP-II) developed by Walker et al. [Error: Reference source not found]. Huang et al.[Error: Reference source not found]translated the HPLP-II into Chinese, which includes 6 dimensions: interpersonal relations (IR), nutrition (NU), health responsibility (HR), physical activity (PA), stress management (SM), and spiritual growth (SG). This study selects 3 items from the NU dimension and adapts them to a low-sugar diet context, such as revising "I choose low-fat, low-saturated fat, and low-cholesterol foods" to "I choose low-sugar foods and beverages," including "I deliberately reduce high-sugar diets and sugary foods" and "I pay special attention to the sugar content labels on food and beverage packaging." Cronbach α=0.851, Mean 3.621, SD 0.990

Conformity（CFM）

The measurement of conformity was based on the Informational and Normative Conformity Scale (SKI-N) developed by Opozda-Suder et al. [Error: Reference source not found], designed for the adolescent population and comprising two dimensions: normative and informational conformity, with a total of 9 items. This study retained the original item stems of the SKI-N and adapted the context from adolescent peer relationships to social media information and social associations. Items included statements such as "I believe it is important to align with the majority on social media, which often leads me to adopt the viewpoints of the majority" and "When uncertain of my own opinions, I tend to refer more to the opinions of others on social media. Cronbach α=0.917, Mean 3.466, SD 0.876

Health Consciousness (HC)

The measurement of health consciousness was based on the Health Consciousness Scale (HCS) developed by Gould [Error: Reference source not found], which comprises four dimensions and nine items. The dimensions include Health Self-Consciousness (HCSC) with items such as "I reflect about my health a lot"; Health Involvement (HI) with items like "I'm very involved with my health"; Health Self-Monitoring (HSM) with items such as "I'm aware of the state of my health as I go through the day"; and Health Alertness (HA) with items like "I'm alert to changes in my health." Cronbach α =0.902, Mean 3.947, SD 0.610

eHealth Literacy (EHL)

The measurement of e-Health Literacy (EHL) utilized a scale developed by Norman et al. [Error: Reference source not found]and translated into Chinese by Guo [Error: Reference source not found], consisting of eight items that assess the application, evaluation, and decision-making capabilities regarding online health information and services. This includes items such as "I am aware of the types of health information available online," "I know how to find useful health information on the internet," and "I know how to use the internet to address my health concerns." Cronbach α=0.902, Mean 3.954, SD 0.600

Face Concern (FC)

Face concern (abbreviated as FC) was measured using a scale adapted from Chan [Error: Reference source not found], which in turn was derived from Cocroft & Ting-Toomey [Error: Reference source not found] and White et al. [Error: Reference source not found], comprising six items. Examples include "I care about others' attitudes towards me" and "I am very pleased to receive respect." Higher scores indicate a stronger sense of face concern. Cronbach α=0.823, Mean 3.898, SD 0.654

Data Analysis Methods

As the multivariate normality test using Stata 15.0 indicated that the study's sample does not adhere to a multivariate normal distribution (Mardia mSkewness=9.57, *P*<.001; Mardia mKurtosis=95.55, *P*<.001). In the context of non-normal sample distribution, PLS-based SEM modeling exhibits robustness with highly skewed data. Furthermore, as suggested by Hair et al. [Error: Reference source not found], PLS SEM is appropriate for complex structural models involving numerous constructs, indicators, and relationships, facilitating a balance between explanation and prediction essential for managerial implications. Considering the intricate nature of the model's pathways and moderating effects discussed in this study, SmartPLS 4.0 software is employed for model construction. In addition, the research utilizes SPSS for conducting descriptive statistics, independent t-tests, reliability assessments, One-Way ANOVA, Pearson's correlation analyses, and exploratory factor analyses. SmartPLS 4.0 is also employed to evaluate the measurement's reliability and validity, as well as to appraise and determine the model's fitness. Evaluation indicators include path coefficients (β), R-squared (R^2), Standardized Root Mean Square Residual (SRMR), Chi-square(χ^2), Normed Fit Index (NFI), Predicted R-squared (Q^2predict), Root Mean Square Error (RMSE), Mean Absolute Error (MAE), Akaike Information Criterion (AIC), Unbiased Akaike Information Criterion (AICu), Final Prediction Error (FPE), Bayesian Information Criterion (BIC), Geweke–Meese Criterion (GM), and Hannan-Quinn Criterion (HQ), among others. For the moderation effect analysis, the structural equation included two interaction items, SMU×FC and HC×EHL. Simple slope graphs were plotted based on the significance and magnitude of the interaction term coefficients.

Results

Differential Test of Demographic Characteristics

Employing SPSS 25.0 software, the study conducted t-tests and ANOVA to assess demographic variations in sugar reduction behaviors within the research sample. Findings revealed substantial disparities in health behaviors among groups categorized by gender(*P*=.046), age(*P*<.001) and Professional background(p<.001). Male participants achieved notably higher scores in sugar reduction behaviors. Participants under the age of 18 showed significantly lower sugar reduction behavior scores, which increased progressively with advancing age groups. Higher BMI groups also exhibited more sugar reduction behaviors. Individuals majoring in science and engineering displayed more pronounced health behaviors than those in liberal arts. No significant differences in sugar reduction behaviors were observed across various educational levels, as illustrated in Table 2.

Table 2. Differential testing of demographic characteristics in sugar reduction behavior(n=883)

Characteristics	mean (SD)	t, F, or r	*P* value	multiple comparison
Gender				
Male	3.67(0.93)	*t*881=2.00	.046	
Female	3.56(1.04)			
Education				
Below junior high school	3.24(0.37)			
High school/secondary vocational education	3.66(0.74)	*F*4,878=2.11	.09	
Junior college	3.89(0.92)			
Undergraduate	3.58(1.04)			
Postgraduate and above	3.62(1.01)			
Age				
15-18	3.51(1.05)			
18-24	3.70(0.94)			
24-30	3.81(0.80)	*F*3,879=6.28	<.001	15-18
30-35	3.95(0.81)			

BMI			
Underweight(BMI<18.5)	3.53(1.03)		
Normal weight (18.5≤BMI<24.9)	3.61(0.97)	*F*2,880=2.27	.10
Overweight(BMI≥25)	3.83(1.01)		
Professional background			
Liberal arts	3.45(1.08)	*t*881=-6.13	<.001
Science and engineering	3.84(0.82)		
Family residence			
Countryside	3.64(0.94)	*t*881=.31	.78
Cities and towns	3.62(1.02)		

Reliability and Validity Testing

Table 3 evaluates the study's convergent validity by examining the composite reliability (CR) and average variance extracted (AVE) for each latent variable. The results show that all latent variables have a CR greater than 0.7, and the majority of the first-order constructs have an AVE above the 0.5 benchmark, signifying that the construct measurements in this research possess satisfactory convergent validity. It is also noted that the correlations among latent variables are below the square root of their respective AVEs, meeting the Fornell and Larcker Criterion for discriminant validity.

Table 3. Correlation analysis and validity(Fornell and Larcker Criterion)

	AVE	CFM	EHL	FC	HC	SRB	SMU
CFM	.56	**.74**[a]					
EHL	.55	.18[b]	**.74**				
FC	.51	.32	.35	**.72**			
HC	.57	.23	.64	.32	**.75**		
SRB	.81	.30	.37	.14	.56	**.90**	
SMU	.51	.51	.37	.39	.38	.34	**.71**

[a]The bold values indicate the square root of AVE

[b]Pearson correlation in the crosstabulation of variables

Common Method Bias Test

Data collected via questionnaires may be subject to common method bias. This study employed Harman's single-factor test to assess all items through a single-factor, unrotated exploratory factor analysis (EFA). A total of seven factors with eigenvalues greater than one were extracted, with the first factor accounting for 22.98% of the variance, which is below the threshold of 40%, suggesting that common method bias in the survey is acceptable. Furthermore, as per Kock [Error: Reference source not found], a Variance Inflation Factor (VIF) greater than 3.3 is indicative of problematic collinearity and potential common method bias contamination. As shown in Table 4, all latent variables in this study have VIFs less than 3.3, indicating that the model is free from common method bias.

Table 4. Common method bias check (VIF of latent variables)

	CFM	EHL	FC	HC	SRB	SMU
CFM				1.35	1.35	
EHL					1.75	
FC	1.23					

HC			1.78	
SRB				
SMU	1.19	1.35	1.54	

Model fit

To validate the research model's selection, we constructed 3 alternative models，Model 4 represents our research model(Figure 1). Alternative Model 1 excludes the pathways SMU→HC and CFM→SRB, transforming it into a sequential mediation pattern. Alternative Model 2 based on Model 4, removes the CFM→HC path, resulting in a parallel mediation model. Alternative Model 3 also based on Model 4, eliminates the SMU→SRB path while retaining the CFM→HC path[⑦]. Upon examination (Table 5), although the NFI values of the four models did not meet the threshold of 0.9, according to Lohmöller [Error: Reference source not found], an NFI value near 0.9 is acceptable when other fit indices are satisfactory.

Table 5. Criteria for alternative Models

	Critieria	A_model1 (sequential)	A_model2 (Parallel)	A_model3 (CFM→HC)	model4 (proposed)
PLS-SEM based	R^2	.336	.327	.320	.327
	adjusted R^2	.335	.325	.318	.325
incremental validity	AIC	-356.57	-342.68	-344.68	-342.68
	AICu	-353.56	-338.67	-341.67	-338.67
	FPE	.668	.678	.677	.678
incremental consistency	BIC	-342.22	-323.54	-330.33	-323.54
	GM	890.56	909.13	893.27	909.133
	HQ	-351.08	-335.36	-339.19	-335.36
PLS predict	Q^2predict	.093	.113	.108	.113
	RMSE	.955	.944	.947	.944
	MAE	.762	.735	.748	.735
PLS model fit	SRMR	.089	.073	.073	.072
	Chi-square	2310.36	1774.38	1799.62	1794.21
	NFI	.888	.892	.890	.890

In a comprehensive assessment of model fit, as indicated by R^2, incremental validity(AIC, AICu, FPE), and incremental consistency indices(BIC, GM, HC), Model 1 significantly outperforms other models. However, it underperforms in PLS predict and model fit metrics, with an SRMR of 0.093, which does not meet the general criterion of below 0.08. Model 3 lags behind in all aspects. Models 2 and 4 show consistent performance across PLS-SEM criteria, incremental validity and consistency, with Model 2 slightly outperforming in model fit.

As shown in Table 6, further analysis using the CVPAT method to evaluate the predictive capability of alternative models against the established model (Model 4) reveals that Model 4 incurs less predictive loss compared to Models 1, 2, and 3, thus demonstrating superior predictive estimation ability. As Turner and Müller [Error: Reference source not found] suggest, a more parsimonious model may exhibit enhanced predictive performance without necessarily excelling in within-sample model selection criteria such as R^2. In conclusion, Our research model achieves a more balanced

[⑦]Due to the inclusion of a saturated model in the model selection criteria, Models 1-4 as analyzed in Table 5 do not incorporate control variables.

performance in both within-sample and out-of-sample predictive capabilities.

Table 6. CVPAT results for alternative Models

Comparison	CVPAT results	Average Losses			
		EM	AM	EM-AM[b]	*P* value[c]
1	EM(Model4) and AM(Model1)[a]	1.09	1.092	-.002	.32
2	EM(Model4) and AM(Model2)	.945	.945	0	.04
3	EM(Model4) and AM(Model3)	.945	.946	-.001	.47

[a]EM refers to the established model; AM denotes the alternative model.The null hypothesis posits equivalent predictive capabilities, while the alternative hypothesis suggests that AM (fourth column) outperforms EM (third column) in predictive accuracy.

[b]A negative difference in mean loss values between EM and AM indicates that EM has a lower mean loss, thus being preferable. A negative mean loss difference implies superior predictive ability for EM.

[c]*P*-values are derived from the PLSpredict/CVPAT module in SmartPLS 4.0 software, with 10 folds and 10 repetitions, utilizing a fixed seed.

Hypothesis Testing

Hypothesis testing was conducted using SmartPLS 4.0 to construct a structural equation model (SEM) in a two-step process. Initially, a chained mediation model without moderating paths was estimated. Subsequently, the model was extended to include moderating effects. Control variables included gender, age, education level, major, BMI, and self-rated health status[⑧].

Direct effect

A Bootstrapping procedure[⑨] with 5000 resamples was employed to estimate the path coefficients and significance levels of the relationships between variables, as presented in Table 7. The R^2 of the model's dependent variable SRB is 0.376, Which aligns with the criteria established by Chin [Error: Reference source not found] and Ringle et al.[⑩] [Error: Reference source not found], signifies a moderate degree of explanatory power.

Table 7. Direct effect path coefficients

Hypothesis	Path	β	SE[b]	t[c]	*P* value	95%CI	Findings
H1	SMU -> CFM	.508[a]	.032	15.86	<.001	0.445—0.571	Supported
H2	SMU -> SRB	.082	.039	2.11	.04	0.006—0.158	Supported
	CFM -> SRB	.139	.037	3.78	<.001	0.066—0.212	
H4	SMU -> HC	.353	.037	9.58	<.001	0.281—0.426	Supported
H5	HC -> SRB	.498	.030	16.37	<.001	0.437—0.557	Supported
H7	CFM -> HC	.054	.042	1.30	.19	-0.028 to 0.134	Not Supported
Control Variables	gender	-.062	.063	0.98	.33	-0.185 to 0.065	
	major	-.231	.063	3.67	<.001	-0.352—-0.108	
	edu	.028	.027	1.02	.31	-0.023 to 0.082	
	BMI	.069	.030	2.35	.02	0.013—0.126	
	health	-.077	.032	2.42	.02	-0.141—-0.017	

⑧ The self-rated health status item is phrased as "How do you rate your health condition in the past six months?" with response options: Very good , Good , Average , Poor , Very poor.

⑨ Bootstrapping is a resampling technique that involves drawing a large number of samples (e.g., 5,000 or more) with replacement from the original dataset to re-estimate model parameters (such as path coefficients), thereby constructing a distribution of the parameter estimates.

⑩ According to Chin [Error: Reference source not found] and Ringle [Error: Reference source not found], an R-squared (R^2) value of approximately 0.670 is considered substantial, a value around 0.333 indicates a moderate level, and a value around 0.190 denotes a weak level of explanatory power.

[a]Considering the accuracy of PLS SEM results reporting, retain three decimal places, and the same applies subsequently.
[b]In the PLS SEM model conclusion report, SE denotes the standard error of coefficients calculated using the bootstrap method, and this applies consistently throughout.
[c]In PLS-SEM, it is not standard practice to calculate degrees of freedom for t-values, as the method relies on bootstrapping for statistical inference. This approach generates a t-distribution for each path coefficient, enabling the derivation of t-values and p-values without the need for traditional degrees of freedom. Consequently, degrees of freedom are not reported for t-values associated with model fit, and this principle will continue to apply in future analyses.

As shown in Table 7, social media usage exerts a significant positive influence on conformity (β=0.508, *P*<.001, 95% CI [0.445, 0.571]), thereby supporting Hypothesis H1. Conformity significantly and positively predicts sugar reduction behavior (β=0.139, *P*<.001, 95%CI [0.066, 0.212]). The direct effect of social media usage on sugar reduction behavior is positive (β=0.082, *P*=.04, 95%CI [0.006, 0.158]), supporting H2. Additionally, social media usage positively affects health consciousness (β=0.353, *P*<.001, 95%CI[0.281, 0.426]), which supports Hypothesis H4. Health consciousness also positively predicts sugar reduction behavior (β=0.498, *P*<.001, 95%CI [0.437, 0.557]), confirming Hypothesis H5.

Referring to Figure 2, the path coefficient for the relationship between conformity and health consciousness is positive but not significant (β=0.054, *P*=.193, 95%CI [-0.028, 0.134]), leading to the rejection of Hypothesis H7. Overall, the path analysis provides support for Hypotheses H1, H2, H4, and H5. In terms of control variables, Professional background, BMI, and self-perceived health status significantly predict preventive behaviors, whereas gender and education level do not exhibit significant predictive effects. Specifically, individuals with a background in science and engineering engage in more sugar reduction behaviors compared to those with a humanities background. Individuals with higher BMI values tend to engage in more sugar reduction behaviors than those with lower BMI values. Furthermore, individuals with lower self-perceived health status are more likely to undertake sugar reduction actions.

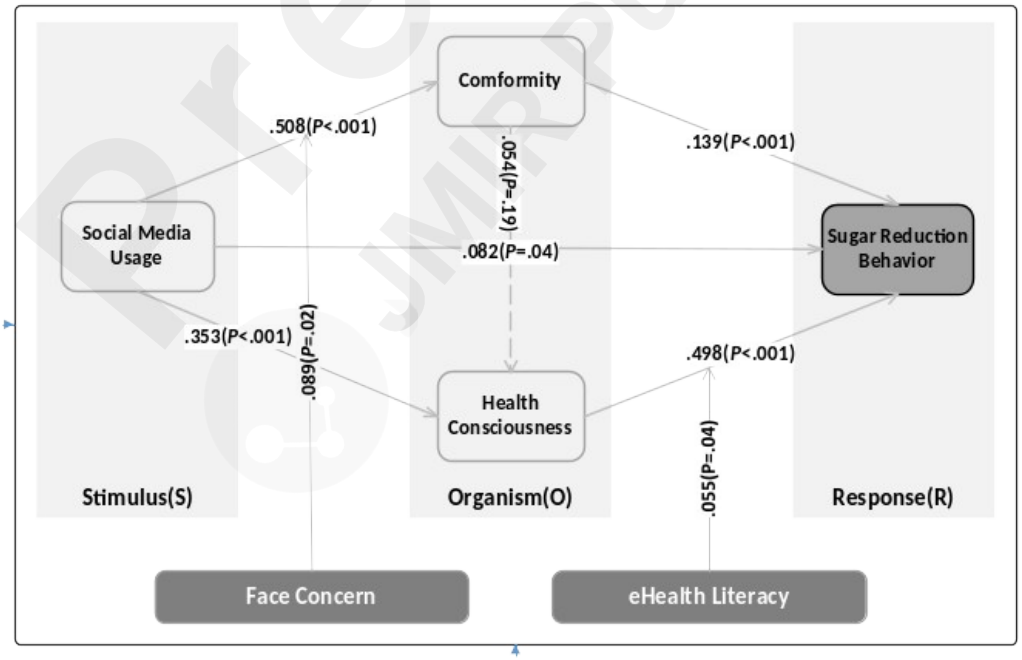

Figure 1 Result of structural model

Mediation Path of Sugar Reduction Behaviors

Mediation effects were examined using the Bootstrap method proposed by Hayes[Error: Reference source not found], with the results presented in Table 8:

Table 8. Mediation effects test[a]

Path	β	SE	95%CI	*P* value	VAF[b]	Hypothesis Findings	Mediation Type
Total effect of SMU → SRB	.342	.033	0.278—0.404	<.001			
Total effect of SMU → HC	.381	.031	0.321—0.443	<.001			
Total effect of CFM → SRB	.165	.044	0.078—0.250	<.001			
Direct effect of SMU → SRB	.082	.039	0.006—0.158	.04			
Total indirect effect of SMU → SRB	.260	.025	0.211—0.311	<.001	76.0%		
Specific indirect effect							
SMU → HC → SRB	.176	.021	0.137—0.220	<.001	51.5%	H6 Supported	Partial
SMU → CFM → SRB	.072	.019	0.034—0.109	<.001	21.05%	H3 Supported	Partial
SMU → CFM → HC	.027	.021	-0.015 to 0.069	.19	7.09%		
CFM → HC → SRB	.027	.021	-0.014 to 0.068	.20	16.36%		
SMU → CFM → HC → SRB	.013	.011	-0.009 to 0.035	.20	4.09%		

[a]Due to space constraints, the results for the coefficients of control variables in the mediation and moderation effects are omitted, and the same applies to the following reports.

[b]In mediation effect analysis, VAF (Variance Accounted For) measures the proportion of variance explained by the mediator in the relationship between the independent and dependent variables. Ranging from 0 to 1, higher VAF values indicate that the mediator accounts for more variance, reflecting a stronger mediation effect. According to Hair et al. (2014) [Error: Reference source not found],VAF >80% indicates full mediation, 20% < VAF < 80% shows partial mediation, and VAF < 20% indicates no mediation.

In the mediation pathway SMU → CFM → SRB, the total effect of social media usage (SMU) on Sugar Reduction Behavior (SRB) is 0.342 (*P*<.001, 95% CI [0.278, 0.404]). The specific indirect effect is significant at 0.072 (*P*<.001, 95% CI [0.034, 0.109]), with the mediation effect accounting for a VAF of 21.05% This suggests that Conformity (CFM) partially mediates the relationship between SMU and SRB, constituting partial mediation, and supports Hypothesis H3.

In the mediation pathway SMU → HC → SRB, the total effect of Social Media Usage (SMU) on Sugar Reduction Behavior (SRB) is 0.381(*P*<.001, 95% CI [0.321, 0.443]). The specific indirect effect is significant at 0.176 (*P*<.001, 95% CI [0.137, 0.220]), with the mediation effect accounting for a VAF of 51.5%. This indicates that Health Consciousness (HC) mediates the relationship between SMU and SRB, establishing partial mediation and supporting Hypothesis H6.

The specific indirect effect in the mediation pathway SMU → CFM → HC → SRB is not significant (β =.013, *P*=.196, 95% CI [-0.007 to 0.035]). The direct effect SMU → SRB is significant at the 5% level (β =.082, *P*=.04, 95% CI [0.006, 0.158]). The chain mediation effect hypothesized by H8 was not supported.

Moderators of Sugar Reduction Behaviors

Based on hypotheses H1a and H5a, moderation effect models were established for the moderated paths of SMU → CFM and HC → SRB by incorporating interaction terms between the moderating variables and the independent variables. The significance of the interaction term coefficients was used as the criterion for determining the presence of a moderating effect.

Table 9. Moderation effects test

Moderated path	Relationships	β	SE	t	95%CI	*P* value	Findings
FC moderates SMU → CFM	SMU → CFM	.439	.038	11.62	0.362—0.512	<.001	H1a Supported
	FC → CFM	.164	.041	3.98	0.084—0.247	<.001	
	FC×SMU → CFM	.089	.039	2.28	0.014—0.166	.02	
	FC at-1SD	.350	.059	10.12	0.228—0.462	<.001	
	FC at+1SD	.528	.049	9.14	0.429—0.621	<.001	

EHL moderates HC→SRB	HC→SRB	.507	.042	12.06	0.422—0.587	<.001	H5a Supported
	EHL→SRB	-.001	.047	0.02	-0.093 to 0.093	.98	
	EHL×HC→SRB	.055	.026	2.06	0.004—0.106	.04	
	EHL at-1SD	.452	.049	9.24	0.357—0.546	<.001	
	EHL at+1SD	.562	.050	11.15	0.462—0.656	<.001	

Table 9 indicates that the interaction term between Face Concern (FC) and Social Media Usage (SMU) significantly and positively influences Conformity (CFM) (β=0.089, *P*=.02, 95%CI[0.014, 0.166]), suggesting that FC positively moderates the impact of SMU on CFM, thereby validating Hypothesis H1a.

Additionally, the interaction term between eHealth Literacy (EHL) and Health Consciousness (HC) significantly and negatively affects Sugar Reduction Behavior (SRB) (β=0.055, p=.04, 95%CI[.004, .106]), indicating that EHL negatively moderates the process through which HC leads to SRB, thus confirming Hypothesis H5a.

Simple slope analyses were conducted using the mean of dispositional mindfulness plus or minus one standard deviation, with the results illustrated in the following figures.

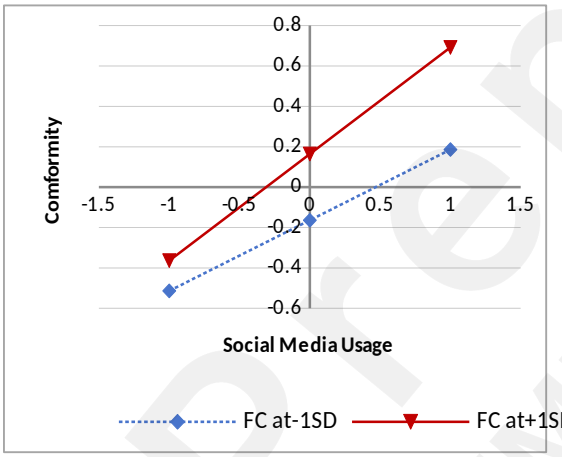

Figure 3 The moderating effect of FC on SMU and CFM

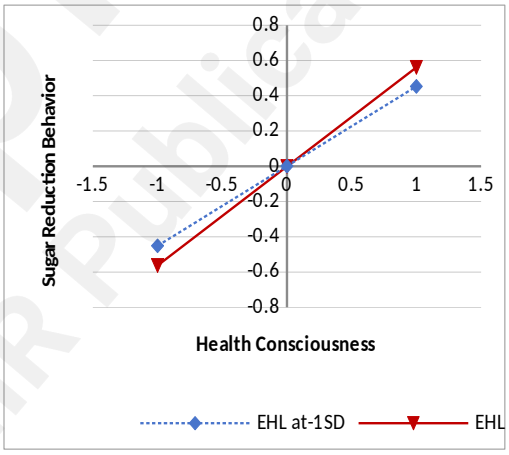

Figure 4 The moderating effect of EHL on HC and SRB

Figure 3 demonstrates that when individuals have a higher level of Face Concern (FC), the positive influence of Social Media Usage (SMU) on Conformity(CFM) is stronger (β=0.528, p<.001, 95%CI[0.429, 0.621]). Conversely, when individuals have a lower level of FC, the positive impact of SMU on CFM is weaker (β=0.350, p<.001, 95%CI[0.228, 0.462]), indicating that face concern intensifies the process by which social media usage leads to conformity.

Figure 4 shows that when individuals possess a higher level of eHealth Literacy (EHL), the effect of Health Consciousness (HC) on Sugar Reduction Behavior (SRB) is relatively stronger (β=0.562, p<.001, 95%CI[0.462, 0.656]). When individuals have a lower level of EHL, the effect of HC on SRB is relatively weaker (β=0.452, p<.001, 95%CI[0.357, 0.546]), indicating that eHealth Literacy can enhance the role of health consciousness in directing individuals towards sugar reduction behavior.

Discussion

Intercultural communication theory highlights the vital importance of cultural identity in health communication, affecting how individuals adopt health behaviors [Error: Reference source not found]. The social media usage and sugar reduction behaviors among Chinese youth are shaped by specific cultural and social factors, which may differ from patterns seen in Western populations. In Western contexts (such as Australia, the USA, Norway, the UK, the Netherlands, Portugal, Poland, etc.), younger demographics encounter greater obstacles concerning healthy eating and the relationship between social media use and dietary issues [Error: Reference source not found,Error: Reference source not found].While Chinese youth may face similar challenges; however, specific circumstances may differ, necessitating targeted research to reveal these nuances. This study highlights the critical role of cultural factors, such as face culture, in health behavior models. The results indicate that face concern significantly moderates the relationship between social media influences and conformity, thereby strengthening health consciousness and decisions among Chinese youth. This distinction is particularly relevant when compared to Western models of health behavior change, which focus more on individual autonomy. By including face culture within the SOR framework, this research enriches our understanding of how cultural mechanisms impact health behaviors, contributing a novel perspective to existing literature on social media and health communication.

Focusing on the youth population in China is significant for several reasons. Firstly, the Chinese youth sample is notably representative within the global context of social media and health behavior research. As of December 2023, there are nearly 5 billion social network users worldwide, with Chinese users accounting for 1.03 billion[11]. Among these, individuals aged 19-35 exceed 406 million, representing 8.1% of global internet users.[12] The health status of Chinese youth is crucial for achieving global health goals; however, relevant research targeting this demographic is currently lacking. Secondly, the unique composition of the Chinese youth sample adds specificity and importance to this study. Finally, despite being a focal point in many health studies, reaching young people regarding health behavior practices remains challenging. This difficulty may arise from factors such as their health cognitive attitudes, lifestyles, environments, and peer pressure [Error: Reference source not found]. Additionally, the specificity of sugar reduction behaviors among youth—who typically experience fewer health issues—means that sugar reduction is not directly linked to treating or preventing specific diseases. This could lead to unclear perceptions and motivations regarding low-sugar diets among young individuals. Although existing studies have recognized the potential of social media for disseminating health information, few have demonstrated actual success in effectively communicating this information to young people [Error: Reference source not found]. Notably, research on the relationship between social media usage and sugar reduction behaviors among Chinese youth remains largely unexplored, which indicates a promising area for potential research growth.

Social Media Usage and Sugar Reduction Trends

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The study results demonstrate that, firstly, the trend of sugar reduction has gained significant popularity among Chinese youth, with only 2.5% (22/883, 2.5%) of the sample not adopting sugar reduction behaviors, which aligns with the results of Feng [Error: Reference source not found]. Compared to related studies in Western countries, the sugar reduction behaviors of Chinese youth exhibit significant uniqueness. This difference may stem from potential variations in social and cultural backgrounds, including cultural preferences and economic motivations [Error: Reference source not found,Error: Reference source not found,Error: Reference source not found]. Secondly, Structural equation analysis indicates that social media usage positively predicts sugar reduction behaviors among Chinese youth, aligning with hypothesis H2 and corroborating the findings of Krishnan et al. [Error: Reference source not found] and Alanzi [Error: Reference source not found], These findings underscore the significant role of social media as a channel for disseminating health information, shaping, and reinforcing healthy behaviors, which also consistent with the perspective of Social Cognitive Theory, which posits that the interplay among observed behaviors, personal cognition, and environmental factors is a key mechanism for behavior change.Thirdly , we find male youth(mean 3.73, SD 0.93) exhibit more sugar reduction behavior scores compared to their female counterparts(mean 3.53, SD 1.03, t881=3.01, , t=3.020, P=.003), which contradicts the prevailing notion that women generally prioritize body image and sugar reduction [Error: Reference source not found]. This discrepancy may stem from women's more ambivalent attitudes toward sweet foods; they often perceive them as unhealthy yet pleasurable [Error: Reference source not found]. This gender difference could also be driven by the sociocultural expectations and peer influences faced by women [Error: Reference source not found,Error: Reference source not found,Error: Reference source not found]. Our findings may also reflect changing perceptions among Chinese women regarding appearance anxiety [Error: Reference source not found] and self-objectification prevention [Error: Reference source not found], which suggests that despite the pressure of traditional norms in Chinese society, young women’s health behaviors may be becoming more autonomous and diverse.

Our research findings reaffirms the validity and predictive power of the SOR model in exploring the stimulus-to-response pathway within a structured framework, Moreover, it offers strategic insights and specific action recommendations for governments, public health organizations, and social media platforms to more effectively address youth sugar consumption issues in health promotion practices.For instance, utilizing the SOR model can assist public health agencies in establishing monitoring systems to evaluate the dissemination effects of health information on social media and changes in youth sugar intake behaviors, thereby providing a basis for ongoing improvement of intervention strategies.

Consciousness or Conformity

Despite the immense potential of social media in promoting health, there is currently a lack of sufficient evidence to demonstrate how to effectively use these platforms to influence behavior [Error: Reference source not found]. Our research clarifies the mechanisms and principles that connect social media usage to sugar reduction behaviors in Chinese youth. Empirical findings indicate that, since the path effect of Hypothesis H6 regarding the influence of conformity intention on health awareness is not significant,the relationship between social media usage and sugar reduction behaviors in Chinese youth is mainly mediated by two pathways:

The primary pathway is that social media promotes sugar reduction behaviors by enhancing individuals' health Consciousness, the results reveal that the mediating role of health

consciousness (VAF=51.50%) is significantly more pronounced than that of conformity (VAF=21.05%). This discovery primarily corroborates Social Cognitive Theory, which suggests that widely accepted and recognized health behaviors can strengthen individual health awareness [Error: Reference source not found]. Furthermore, the efficient dissemination capabilities of social media amplify this effect [Error: Reference source not found,Error: Reference source not found]. As China's economy develops and living standards rise, the health consciousness among youth is progressively strengthening. The popularization of government health policies, the deep-rooted wellness culture in China[Error: Reference source not found], and the broad distribution of health information following the COVID-19 pandemic, These factors have jointly increased youth awareness of the potential health risks linked to high-sugar foods through social media channels [Error: Reference source not found], facilitating the adoption of sugar reduction behaviors [Error: Reference source not found] .Furthermore, this finding highlight a significant perspective in social psychology: although Chinese society traditionally emphasizes collectivism and conformity behaviors, contemporary Chinese youth demonstrate notable individual independence in making health-related decisions. This contrasts with previous literature describing individual behaviors within a collectivist cultural context.

In societies with collectivist values like China, individual actions and decisions are frequently heavily influenced by family members, social groups, and authority figures. Nevertheless, our research shows that in the particular aspect of healthy eating, Chinese youth can surpass conformity and rely more on their personal health consciousness when making decisions. This disparity may stem from several factors: such as independence in accessing online information [Error: Reference source not found] personalized health needs [Error: Reference source not found] improvements in critical thinking skills and education levels [Error: Reference source not found], and the global influence of multiculturalism and values [Error: Reference source not found]. Our findings emphasize the importance of prioritizing health consciousness in health education and behavior change initiatives, furthermore, indicating the considerable potential of social media to enhance behavioral changes which rooted in health consciousness and is more likely to be sustained due to its foundation in deep personal beliefs. Thus, offers a fresh viewpoint for comprehending the health behaviors exhibited by Chinese youth, which has important implications for formulating effective strategies for health promotion.

The secondary influence of social media usage on sugar reduction behaviors manifests through the reinforcement of conformity among youth. This collective behavior is influenced by Eastern collectivism and traditional wellness culture, leading to a notable tendency for conformity on social media. Consequently, sugar-reduction concepts recommended by KOLs (key opinion leaders), professional media, and health experts on social media quickly gain popularity and imitation. These ideas extend into the social and consumer realms as popular culture, giving rise to youth trends and consumption concepts such as "sugar-free socializing" and "0 sugar, 0 fat, 0 calories." From an economic perspective, the advancement of sugar reduction initiatives in China is also driven by the rise of the domestic health industry. This includes innovations and developments in the low-sugar health food market and increased investments in products related to healthy lifestyles. The convergence of these economic incentives with public health goals and youth trends contributes to the widespread acceptance of sugar reduction practices. This cascading effect not only establishes a positive loop from social media to popular culture and then to the consumer market, but also swiftly establishes a low-sugar healthy lifestyle, with conformity serve as a crucial catalytic role.

Our finding shows significant differences compared to research results from other regions of the world. For instance, in Western contexts, cultural norms favoring sweet foods and the conflict of economic interests, along with the cultural identity crisis brought about by changes in dietary habits, are considered major obstacles to advancing sugar reduction measures[Error: Reference source not found,Error: Reference source not found,Error: Reference source not found]. Therefore, the differences in sugar reduction behaviors among Chinese youth not only reveal health behavior patterns across different cultural contexts, but also underscore the significance of economic, social, and policy factors in shaping these behaviors. Consequently, it is evident that implementing sugar reduction interventions requires different strategic considerations based on varying national and cultural contexts.

The Moderating Role of face Concern in Chinese Tradition

The social ecological perspective suggests that the concern for "face" emerges from societal expectations, prompting individuals to engage in conformity behaviors to gain social approval [Error: Reference source not found]. This phenomenon is a defining characteristic of social interactions in Chinese society [Error: Reference source not found] and serves as a foundational element of collectivism in Asia [Error: Reference source not found]. These long-standing cultural norms have been internalized by contemporary Chinese youth, evolving into what Zhang [Error: Reference source not found] describes as "the most subtle standard in social interactions among Chinese people." Consequently, social media usage among Chinese youth acts as a secondary projection of these cultural norms, where individuals may suppress dissenting views to maintain harmony within their social groups (online circles or communities), thereby exhibiting conformity that align with group expectations. Our research substantiates the reinforcing role of face concern in social media conformity. According to social influence theory, individuals are influenced by both informational and normative factors, which can lead to changes in attitudes and behaviors [Error: Reference source not found]. The relationship between social media usage and sugar reduction behaviors among Chinese youth aligns with this framework. For example, young people frequently encounter posts, articles, and videos on social media that emphasize the benefits of sugar reduction. In the absence of adequate knowledge about sugar reduction, they may observe and imitate the behaviors of key opinion leaders (KOLs) and influencers to avoid potential embarrassment from uninformed choices [Error: Reference source not found], thus making similar behavioral decisions. This aligns with Pfender's [Error: Reference source not found] findings that such behaviors, based on learning or imitation, reflect informational conformity. Additionally, Chinese youth on social media often seek recognition and support from others to enhance their face. If sugar reduction is perceived as a trend or societal expectation, young people may engage in sugar reduction actions to garner "likes," comments, and shares. Others may exhibit normative conformity tendencies due to perceived social pressures, further fueling enthusiasm for the sugar reduction trend.

Interestingly, our findings diverge significantly from a study published in the Journal of the American Medical Association (JAMA) in 2022. This research found a correlation between posts about unhealthy foods from well-known celebrities—such as actors, athletes, and singers—and increased engagement from followers, while healthier food options garnered fewer likes and comments [Error: Reference source not found]. This discrepancy may be attributed to differing cultural perceptions of face in Eastern and Western societies. Chinese culture emphasizes a collective desire for positive face, wherein individuals seek admiration and respect while prioritizing group face and notions of status and hierarchy. Consequently, Chinese youth are more inclined to admire or conform to opinion leaders like KOLs. In contrast, Western culture places less emphasis on status and hierarchy, valuing individual freedom and uniqueness. This

leads individuals to strive for independence and resist external constraints, reflecting a negative face concern [Error: Reference source not found]. As a result, this cultural distinction may manifest in social media behaviors that intentionally or unintentionally contradict celebrity opinions. This perspective offers a fresh lens through which to examine sugar reduction and health promotion behaviors in cross-cultural communication contexts. In the context of Chinese youth, an analysis using the SOR model can effectively incorporate cultural influences on stimuli, organisms, and responses, aligning with Chinese values. Given the importance of group harmony and consensus, it is essential to design sugar reduction messages that resonate with these cultural tenets. Integrating cultural narratives can enhance message acceptance. Additionally, leveraging the concept of "face" as a motivational tool can encourage positive social media representations, prompting youth to share their healthy eating habits and achievements or train as peer educators. This engagement fosters peer recognition while fulfilling social expectations related to "face", thereby accelerating the dissemination of healthy behaviors.

The Moderating Role of eHealth Literacy

Data from multiple countries indicate that excessive sugar intake is associated with various health conditions. Despite the issuance of guidelines regarding sugar consumption by health organizations, these recommendations are frequently unmet, particularly among young people, most of whom do not perceive themselves as being at risk [Error: Reference source not found]. Research conducted in China further reveals that college students engage in only moderate health-promoting lifestyles, highlighting a concerning trend [Error: Reference source not found]. Within the SOR model, electronic health literacy serves as a key component at the organism level, shaping how individuals interpret health information and subsequently influencing their behaviors. As a crucial source of health information for young people, improving electronic health literacy in social media contexts is essential for promoting health awareness and encouraging positive behavior changes. Previous studies have demonstrated that eHealth literacy enhances individuals' abilities to obtain and comprehend health information, thereby increasing their perceived behavioral control and influencing health beliefs and intentions. This conclusion is supported by various studies showing the role of eHealth literacy in promoting health behaviors among diabetes patients [Error: Reference source not found] and in improving community self-care practices while reducing health disparities [Error: Reference source not found].However, our research indicates that even when young individuals possess a certain level of health consciousness and recognize the importance of health, this does not automatically translate into healthy behaviors. For instance, while some young people express a willingness to follow medical advice, lose weight, and adopt healthier lifestyles, they often encounter barriers such as time constraints for preparing healthy meals, insufficient financial resources, and inadequate or incorrect understanding of healthy eating principles [Error: Reference source not found]. These challenges can potentially be mitigated through targeted interventions focused on enhancing eHealth literacy. Our findings further reveal that youth with higher levels of eHealth literacy are more likely to effectively convert their health consciousness into healthy behaviors—such as engaging in sugar reduction—by improving their abilities to search for, understand, evaluate, and apply health information. This aligns with the conclusions of Van De Bel et al. [Error: Reference source not found], Consequently, implementing eHealth literacy education programs and workshops can effectively enhance young people's skills in assessing online health information. Additionally, leveraging the SOR model's theoretical framework, collaborations with experts from various disciplines, including information technology, psychology, and nutrition, could jointly develop and implement innovative strategies to enhance e-health literacy.

Conclusion

This study examines social media's role in shaping sugar reduction behaviors among Chinese youth, finding that it promotes such behaviors mainly by increasing health awareness and secondarily by influencing conformity due to face concerns. EHealth literacy moderates these effects positively. The marginal contribution of the research lies in its novel application of the SOR framework to investigate the mechanisms of social media's impact on sugar reduction behaviors among youth, emphasizing the interplay between conformity and health consciousness. By combining insights from communication studies and psychology, it reveals the regulatory effects of face concern and eHealth literacy in Eastern cultures, thereby enhancing our understanding of the theoretical mechanisms in public health management and health communication, and offering a systematic and culture-specific exploration of health communication principles and their cultural variations, adding more diverse and in-depth views to the global health communication discourse.

Operationally, by leveraging the SOR model's structural and culturally adaptive features, we can enhance approval, involvement, and eHealth literacy for sugar reduction through health education courses, workshops, and community initiatives. Promoting role models on social media and implementing peer education, along with sugar reduction challenges, can align health governance strategies with regional cultural values. Additionally, utilizing the SOR model's scalability allows governments to coordinate efforts across education, health, and media sectors to develop algorithms and monitoring systems that suggest and oversee sugar reduction information. This approach maximizes the reach and engagement of platforms to improve intervention effectiveness. In conclusion, there is a need for a focused examination of global youth's social media usage and eating disorders, considering various factors such as time, gender, region, and culture to create tailored strategies for enhancing youth health perspectives and public health governance.

Limitations and Prospects

This study has several limitations. First, the data were collected through online sampling using self-administered questionnaires, which may not fully address common method bias. This could be mitigated at the design stage by distributing different scales in batches and incorporating peer assessments for some measures. Future research should consider more refined sampling strategies to enhance randomness and representativeness. Second, due to constraints in the research framework and length, we focused on the general effects of social media use on sugar reduction without exploring how different types of social media platforms, as well as usage motivations and methods, influence sugar reduction behaviors among youth. This area warrants targeted exploration in future studies. Additionally, we treated the surge of health communication on Chinese social media platforms as an exogenous condition influencing conformity, which requires further investigation into its underlying mechanisms. Third, although the model included several control variables, it may still overlook potential confounding factors that could impact the results. For example, certain individual characteristics might simultaneously affect youth social media usage and their health consciousness or conformity, thus future studies should incorporate additional control variables to enhance the robustness of the findings. Fourth, comparative examinations across different cultures or contexts hold significant research value. For instance, American consumers may prioritize personal reputation and self-expression, with their consumption behaviors driven more by individual choice than by adherence to social expectations or group pressure [Error: Reference source not found]. Integrating various cultural backgrounds with specific research contexts can help challenge common cross-cultural generalizations in this field, leading to more nuanced and in-depth future research. Finally, the

boundaries of this study could be expanded to include areas such as excessive sugar reduction behaviors in social media contexts and the long-term impacts of social media use on youth dietary culture and health-promoting behaviors. These topics represent promising avenues for future research.

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Acknowledgments
The authors would like to thank Questionnaire Star Company for their help with the data collection. We are grateful to the journal editors and the anonymous reviewers for their helpful comments and suggestions.

Conflicts of Interest
None declared.

Authors' Contributions
The study was conceptualized by BH, YZ, CL, and the data were curated by RB, ZZ, and AL. Formal analysis was performed by BH, YZ. The methodology was devised by CL. Supervision was done by CL, and validation was done by RB, ZZ,AL. The original draft was written by BH, YZ, and the paper was reviewed and edited by CL.

Multimedia Appendix
The questionnaire used in the survey.

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Abbreviations

SMU: social media usage
SRB: sugar reduction behavior
HC: health consciousness
FC: face concern
ANOVA: analysis of variance
SRMR: standardized root mean square residual
RMSE: root mean square error
MAE: mean absolute error
EFA: exploratory factor analysis
VIF: variance inflation factor
AVE: average variance extracted
NFI: comparative fit index
AIC: Akaike Information Criterion
AICu: Unbiased Akaike Information Criterion
FPE: final prediction error
GM: Geweke–Meese criterion
HQ: Hannan-Quinn criterion

SEM: structural equation modeling

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Figures

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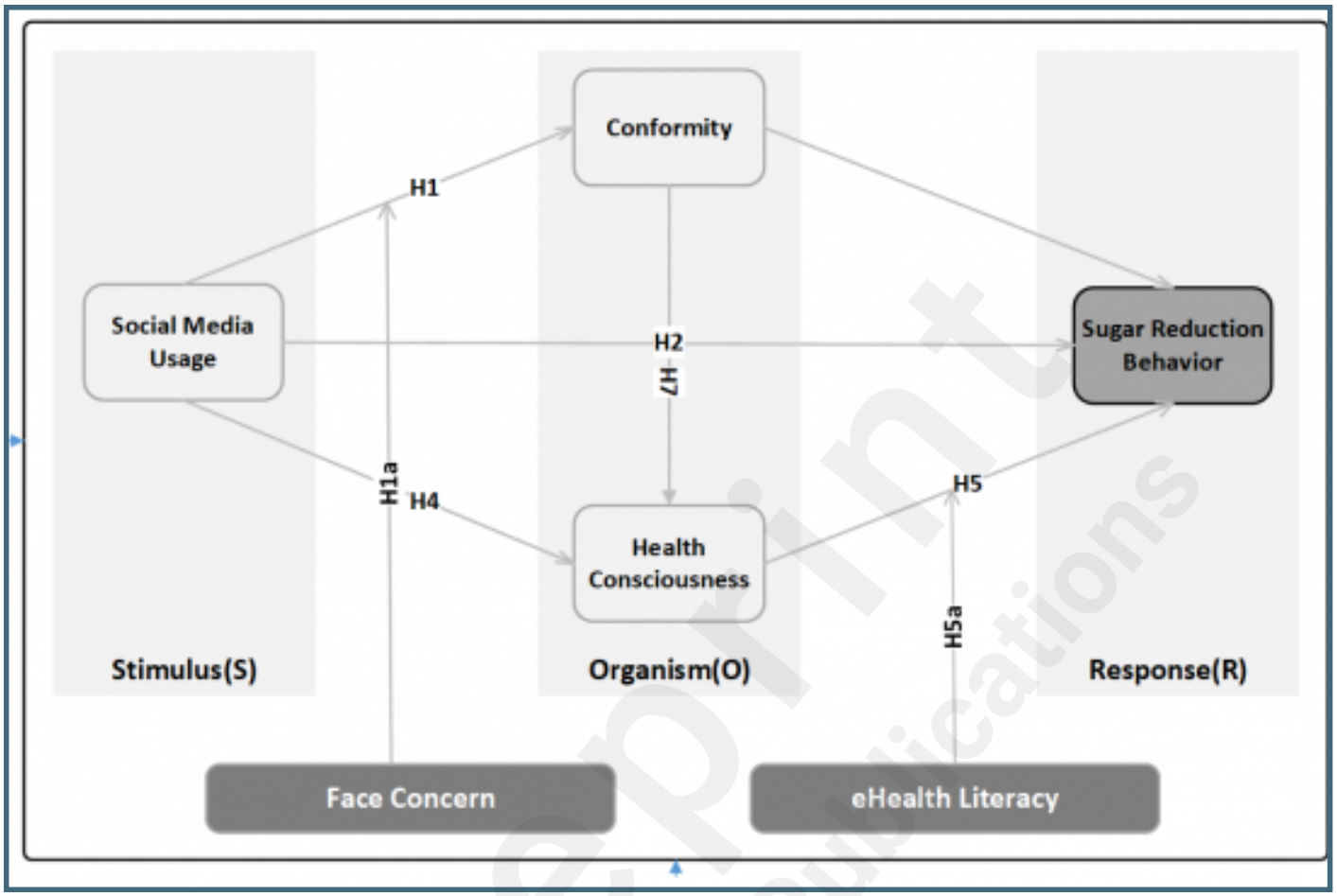
Conceptual Model and research hypotheses.



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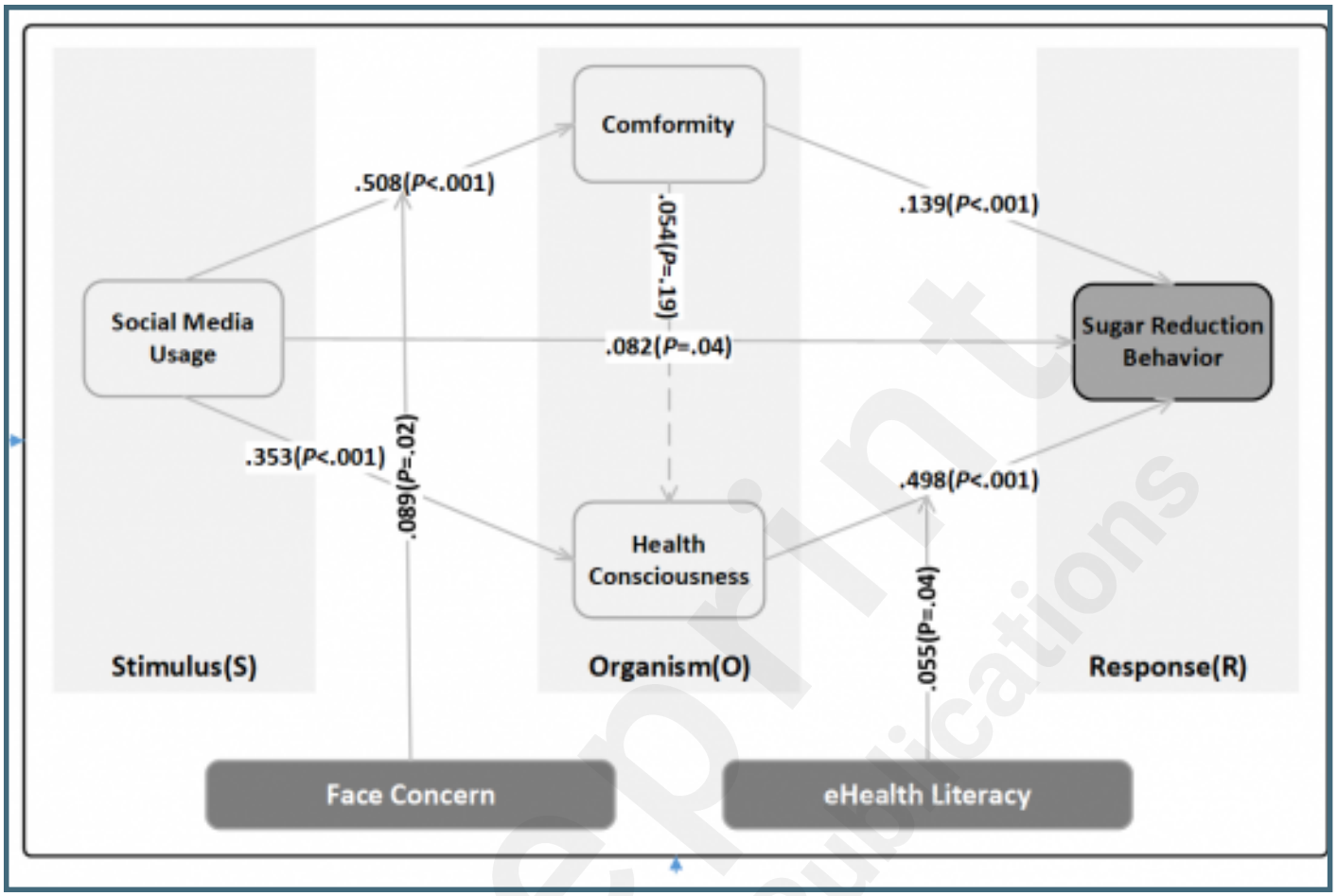
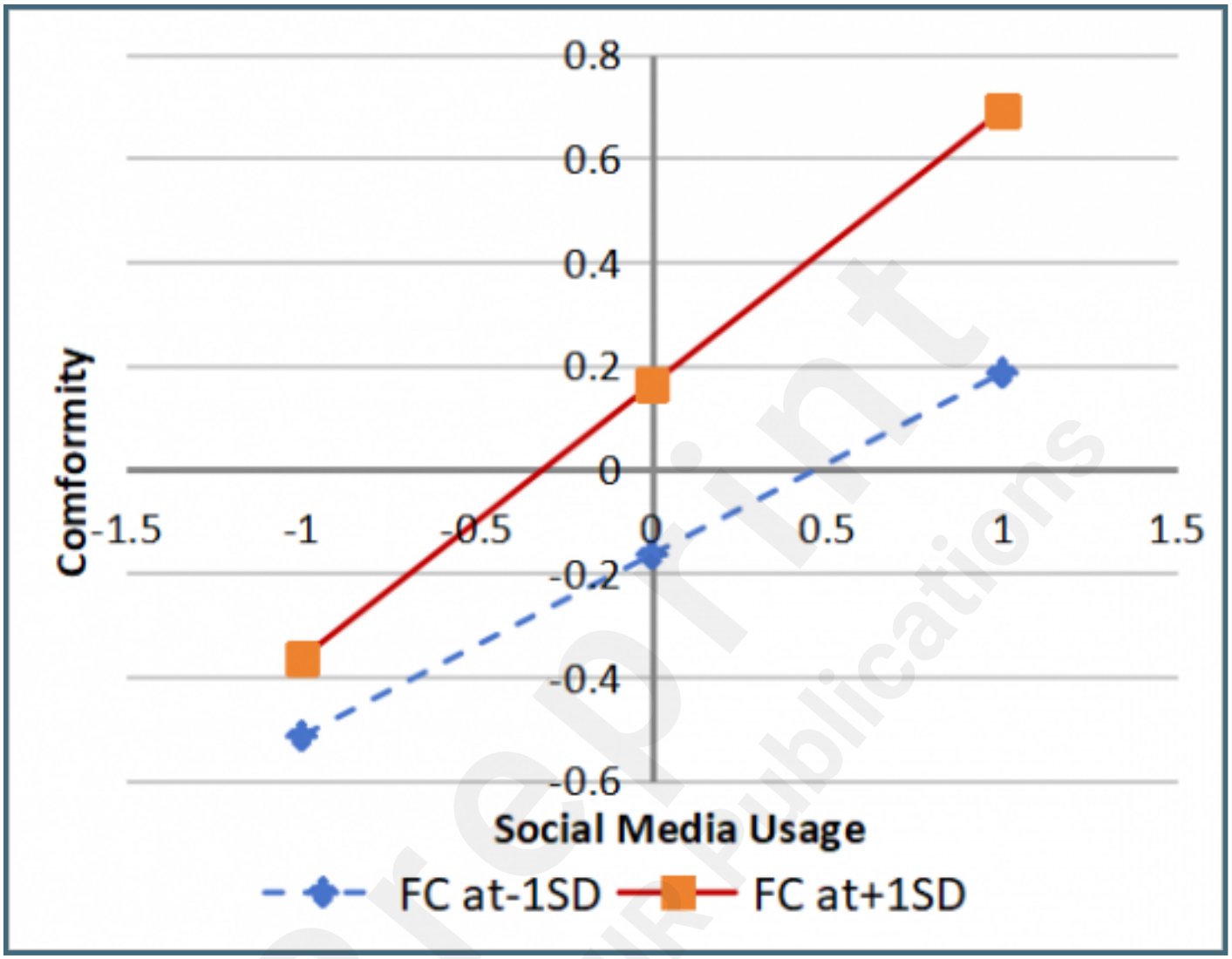
Result of structural model.



FC Moderating Effect Diagram.



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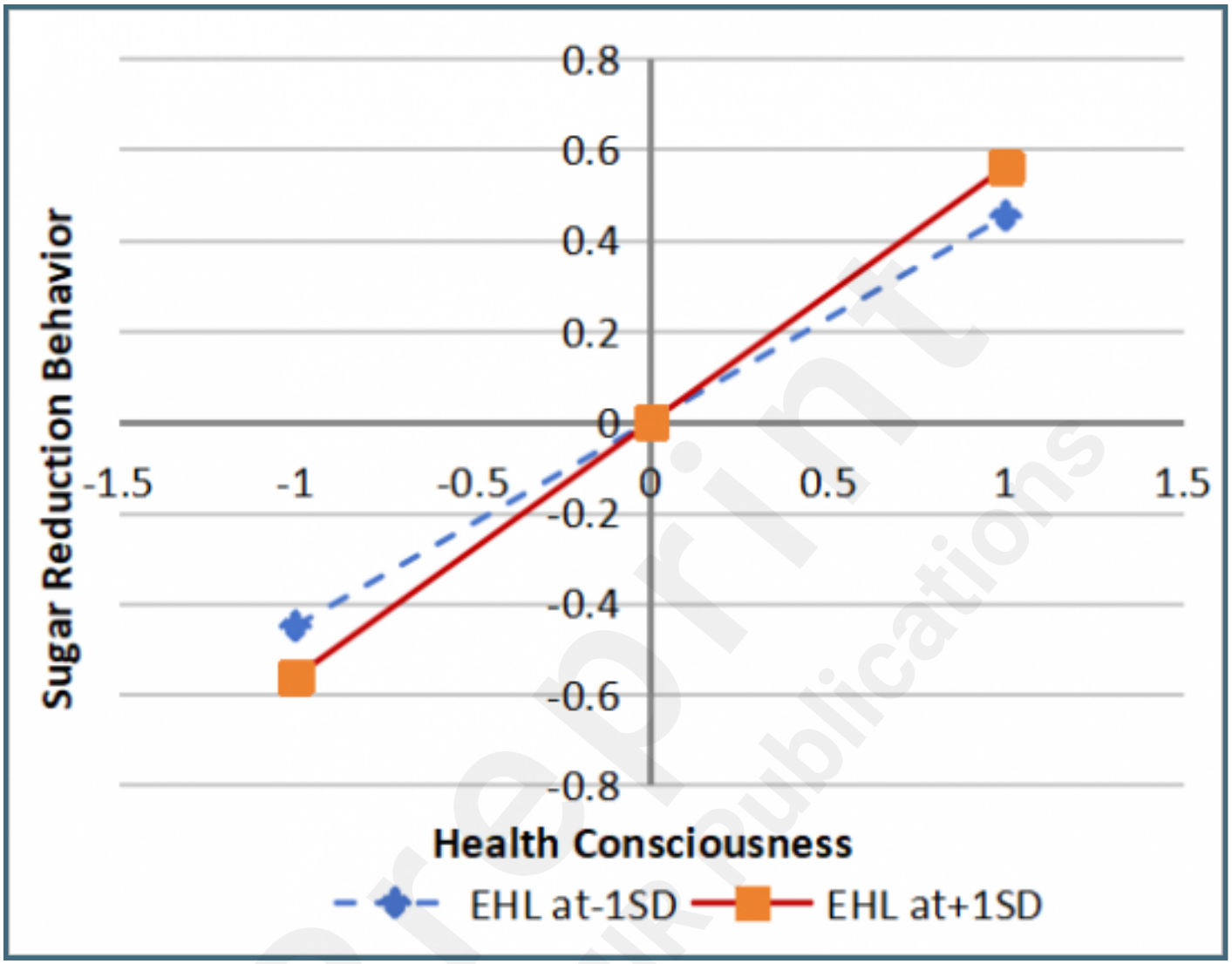
EHL Moderating Effect Diagram.



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Multimedia Appendixes

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The questionnaire used in the survey.
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