Weight bias internalization and its association with psychological distress and weight-related factors among youths in university, Thailand

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Abstract:

BACKGROUND: Weight bias internalization (WBI) is associated with poor weight-related health and psychological health problems in adults. However, less is known about WBI in Thai youths, and its associated factors are scarce. This study aimed to assess the association between psychological, weight-related factors, and WBI among Thai youths.

MATERIALS AND METHODS: A cross-sectional design was conducted on 1185 university youths from three universities in northeastern, Thailand from January to June 2023, with multistage sampling methods. The data were collected by self-administered questionnaire. Multinomial logistic regression was applied to explore factors that influence WBI.

RESULTS: Most of the youth were female; with the average body mass index (BMI) was 23.3 ± 3.2 kg/m². More than half ($n = 628$; 52.9%) of them reported a high level of WBI that was present across the weight spectrum. Approximately 41.4% ($n = 490$) reported being dissatisfied with their body image, and 50.6% ($n = 600$) had peers with obesity. WBI was positively related to depressive symptoms, perceived stress, the experience of weight stigma, BMI, and body image dissatisfaction. Conversely, it was negatively related to self-esteem and peers with obesity.

CONCLUSION: WBI is influenced by several psychological and weight-related factors. Additionally, youths across body weight categories could be vulnerable to high WBI. Hence, consideration of these potential factors could be useful in designing targeted interventions to reduce WBI.

Keywords:

Body image, body mass index, psychological distress, weight bias, youth

Introduction

Overweight and obesity are crucial global public health issues. In 2016, WHO reported that the prevalence of overweight and obesity among children and adolescents had risen from 4% in 1975 to over 18% in 2016.[1] In Thailand, the prevalence of adolescent obesity has increased from 25.3 to 33.9% in females and 25.5 to 31.6% in males from 2014 to 2020.[2] Adolescents who are overweight or obese are prone to a high risk of obesity-related noncommunicable disease, psychological problems, and social problems, including weight bias internalization (WBI).[3,4] The WBI occurs when individuals with overweight or obese are aware of negative weight-based stereotypes and apply those stereotypes to themselves.[5,6] Many studies showed that WBI is widespread in adults and adolescents, particularly those who are overweight or obese and may be sensitive and vulnerable to WBI. Besides, it has been linked to adverse health outcomes across the psychological (e.g. depression, perceived stress, low self-esteem, body

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dissatisfaction) and physiological (e.g. increased cortisol).[7,8] Hence, youths who experience WBI face societal devaluation, negative stereotypes, and prejudice, and may encounter negative effects on their weight-related health problems.[6,7] Moreover, the WBI studies have initially focused on individuals with overweight or obese.[6] However, some evidence suggested that WBI is also presented in individuals with normal weight and underweight.[9,10] Therefore, individuals across the weight spectrum are at risk of WBI and its negative health outcomes.

In Thailand, previous studies showed that approximately 48.2% of adolescents experienced cyberbullying about their weight.[11] Furthermore, the social trend that a slim figure is more attractive has become popular among Thai adolescents, previous research revealed that Thai youths perceived beauty standards from cultural ideals, and those who with overweight were at higher risk of psychological distress due to their weight.[12,13] Thus, maybe Thai youths might encounter WBI and its negative consequences for their weight. However, there is still a lack of research on WBI, and the evidence for the factors contributing to WBI among Thai youths remains limited.[11,14] Therefore, this study sought to examine the potential factors associated with WBI that may be useful to identify individuals at risk for WBI and develop appropriate and effective interventions to reduce WBI and its negative effects.

Materials and Methods

Study design and settings
This cross-sectional study was conducted from January to June 2023 at the three universities located in the upper-, middle-, and lower parts of northeastern, Thailand.

Study participants and sampling
The eligible participants were undergraduate students aged 18–22 years with no communication problems who were willing to participate, while those who provided incomplete questionnaires were introduced as extinction. The sample size was calculated by using Cochran's formula[15] with an estimator of the percentage of adolescents who experienced weight stigma (48.2%) in the research followed by Thumronglaohapun *et al.*,[11] and we desired a 95% confidence interval and precision of 3%. This accounted for 1066 students, plus 10% for nonresponse adjustment. The final sample size was 1185 students from all 1,325 students enrolled and 140 students were excluded for incomplete responses. Thus, 1185 students who met the eligible criteria were selected by using the multistage sampling technique. In the first stage, we used the simple sampling method as a lottery method to select three universities based on their geography (one university per part of the region).

In the second stage, we selected the six faculties of each university using the lottery method from a list of faculties at each university. In the third stage, the students were selected using a systematic random sampling of each university sampling frame. Every fifth student on the list was selected as a participant, and we excluded them in case the student was absent or unwilling to participate; then, the student next on the list was taken in.

Data collection tool and technique
The self-administered questionnaires were composed of four parts as follows:

Predictor variables
Part 1: Sociodemographic factors and anthropometric information. The sociodemographic variables include age, sex, monthly household income, and friends and family members with obesity. All variables were identified as dichotomous variables. Anthropometric questions include weight (kg) and height (m). A portable height and weight meter were used to gauge the students' height and weight. Body mass index (BMI: kg/m^2) was calculated as weight (kg) divided by height (m^2). The weight status was classified with the Asia-Pacific BMI classification[16] as underweight (BMI < 18.5 kg/m^2), normal weight (BMI 18.5–22.9 kg/m^2), overweight (BMI 23–24.9 kg/m^2), and obese (BMI ≥ 25 kg/m^2).

Part 2: Weight-related factors include body image satisfaction and experiences of weight stigma. Body image satisfaction was defined as the students being asked, "Are you satisfied with your figure?".[17] The respondents were categorized into two groups: satisfied if they answered "yes" and dissatisfied if they answered "no." Besides, the experience of weight stigma was assessed using the Brief Stigmatizing Situation Inventory (SSI-B),[18] reflecting lifetime people's experiences with weight stigma. This scale consisted of 10 items rated on a 10-point scale, ranging from 0 (never) to 9 (daily). (Cronbach's alpha was 0.82, indicating good internal consistency). The results are obtained by calculating the mean of all responses, with higher scores indicating greater exposure to stigmatizing experiences. In this study, the mean score ranges from 2.30 to 4.20.

Part 3: Psychological factors comprised depression, perceived stress, and self-esteem.

Depression: The 21-item Beck Depression Inventory-II[19] was used to assess depression symptoms. The students were asked to respond to each item in the past two weeks based on their experiences. This scale is rated on 4-point scales, ranging from 0 to 3. A total sum score ranges from 0 to 63. The higher scores indicate a greater severity of depression symptoms. The scale showed good internal consistency (Cronbach's alpha was 0.84).

Perceived stress: The Thai version of the Perceived Stress Scale-10, which was translated and validated by Wongpakaran and Wongpakaran,[20] was used to assess the perceived psychological stress status in the past month. This is a 10-item self-report scale that is rated on a 5-point Likert scale, ranging from 0 (never) to 4 (very often). The total score ranges from 0 to 40, with higher scores indicating greater perceived stress. It has good internal consistency with Cronbach's alpha was 0.88.

Self-esteem: We administered the Rosenberg Self-Esteem Scale (RSES)[21,22] to measure students' self-esteem. This is a 10-item questionnaire with a 4-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree). Summary scores range from 10 to 40, with higher scores indicating higher self-esteem. The scale demonstrated good internal consistency (Cronbach's alpha was 0.82).

Outcome variable
Part 4: The primary outcome of this study was weight bias internalization (WBI). This WBI was measured by the Modified Weight Bias Internalization Scale (WBIS-M),[23] which assessed the extent to which students blame themselves for stigma and apply negative weight-based stereotypes to themselves. The WBIS-M allows for the assessment of WBI among individuals who do not identify as overweight or obese. This is a 10-item that is scored on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The WBIS-M scores are computed by averaging all items, with higher scores indicating higher WBI. We divided the WBIS-M scale into three groups (high, moderate, and low) based on the mean of the scale and one standard deviation (SD) that has been used in the study of Puhl *et al*.[24] The mean and SD in this study were 3.39 ± 0.86, so we utilized that as our cutoff point. Therefore, low level (1 SD below the mean) corresponded to WBIS-M scores ≤ 2.53, moderate level corresponded to WBIS-M scores 2.54–4.24, and high level (1 SD above the mean) corresponded to WBIS-M scores ≥ 4.25. The scale has strong internal consistency (Cronbach's alpha was 0.83).

Data analysis
Descriptive analyses were performed for all variables' characteristics. Then, the bivariate odds ratio (OR) was computed to assess the association between each predictor and WBI. The adjusted OR estimated from multinomial logistic regression indicated the relationship between psychological, weight-related factors and WBI after adjusting for all other predictors. A series model was developed. First, in model 1, we added three psychological variables to the model. Then, in model 2, two weight-related variables were entered into model 1. Finally, in model 3, all sociodemographic and anthropometric variables were entered into model 2. In

all models, low levels of WBI were the reference group of outcome variables. Significance for all assessments was accepted as *P* value < 0.05, and SPSS version 20.0 (IBM Corp., Armonk, NY, USA) was performed for all analyses.

Ethical consideration
Written informed consent was obtained from the participants following the research information, and a self-reported questionnaire was administered to the participant for data gathering. This study was approved by the Review Ethics Boards of Mahasarakham University (ref. no. 418-428/2022).

Results

Most of the respondents were female (58.6%), their median age was 20 years old, and the average BMI was $23.3 \pm 3.2 \text{ kg/m}^2$, which falls in the "overweight" range. By BMI categories, about 37.7% of them were normal weight, 29.1% were overweight, and 26.7% were obese. More than half (52.9%) of them reported a high level of WBI, which was particularly present in participants with overweight (42.7%) and obesity (32.5%). However, it has also been found in the normal weight category (18.6%). Approximately 57.2% had a monthly household income of 8,000 Thai baths or above (250 US$), 50.6% indicated peers with obesity, and 41.4% felt dissatisfied with their body image; also, the average experience of weight stigma was 3.1 ± 0.5. Regarding the psychological factors investigated, the mean score for depression, perceived stress, and self-esteem were 22.4 ± 4.3, 23.7 ± 7.2, and 20.7 ± 6.9, respectively [Table 1].

Bivariate models: In both the high and moderate levels of the WBI category, there was a statistically significant increase in WBI among adolescents who had higher depressive symptoms or perceived stress, lower self-esteem scores, higher experiences of weight stigma, higher BMIs, and were dissatisfied with their bodies. Conversely, those who had friends with obesity were significantly associated with decreased WBI. There was no association between WBI and age, sex, monthly household income, or family members with obesity examined [Tables 2 and 3].

Multivariate models: In multinomial logistic regression analyses, the results were almost identical for both high and moderate levels of WBI categories. Model 1 showed that three psychological factors were strongly associated with WBI, which is similar to the bivariate model. In model 2, weight-related factors were added to model 1. The higher experience of weight stigma and body image dissatisfaction were significantly related to greater WBI. In model 3, sociodemographic factors were added to the model. The results were identical to those in model 2, and

Table 1: Distribution of sociodemographic factors, weight-related factors, and psychological factors by weight bias internalization

Variables	Weight bias internalization			
	Total (*n*=1185) *n* (%)	High level (*n*=628) *n* (%)	Moderate level (*n*=371) *n* (%)	Low level (*n*=186) *n* (%)
Sociodemographic factors				
Age (y)				
<20	630 (53.2)	340 (54.1)	198 (53.4)	92 (49.5)
≥20	555 (46.8)	288 (45.9)	173 (46.6)	94 (50.5)
Sex				
Female	695 (58.6)	376 (59.9)	220 (59.3)	99 (53.2)
Male	490 (41.4)	252 (40.1)	151 (40.7)	87 (46.8)
Monthly household income (THB)				
<8000	507 (42.8)	274 (43.6)	157 (42.3)	76 (40.9)
≥8000	678 (57.2)	354 (56.4)	214 (57.7)	110 (59.1)
Friends with obesity				
Yes	600 (50.6)	309 (49.2)	182 (49.1)	109 (58.6)
No	585 (49.4)	319 (50.8)	189 (50.9)	77 (41.4)
Family members with obesity				
Yes	467 (39.4)	240 (38.2)	144 (38.8)	83 (44.6)
No	718 (60.6)	388 (61.8)	227 (61.2)	103 (55.4)
Body mass index (BMI) (kg/m^2)	23.3±3.2	24.1±3.2	22.8±3.2	21.5±2.8
BMI category (kg/m^2)				
Underweight (BMI <18.5)	77 (6.5)	39 (6.2)	11 (3.0)	27 (14.5)
Normal weight (BMI 18.5–22.9)	447 (37.7)	117 (18.6)	217 (58.5)	113 (60.8)
Overweight (BMI 23–24.9)	345 (29.1)	268 (42.7)	58 (15.6)	19 (10.2)
Obese (BMI ≥25)	316 (26.7)	204 (32.5)	85 (22.9)	27 (14.5)
Weight-related factors				
Experience of weight stigma	3.1±0.5	3.2±0.5	3.1±0.4	2.9±0.5
Body image satisfaction				
Satisfied	695 (58.6)	352 (56.1)	211 (56.9)	132 (71.0)
Dissatisfied	490 (41.4)	276 (43.9)	160 (43.1)	54 (29.0)
Psychological factors				
Depression	22.4±4.3	24.5±3.5	21.5±3.4	17.1±3.5
Perceived stress	23.7±7.2	26.5±6.4	23.1±6.4	15.9±6.0
Self-esteem	20.7±6.9	18.9±6.4	21.1±6.3	26.3±7.1

Values are presented as number (%) or mean±standard deviation; THB, Thai baht

all psychological and weight-related factors remained significantly associated with WBI after controlling for other predictors. In addition, individuals with higher BMIs had higher levels of WBI, whereas those who had obese peers had lower levels of WBI [Tables 2 and 3].

Discussion

This present study revealed that higher levels of WBI were associated with negative psychological outcomes, including severe depressive symptoms, higher perceived stress, and low self-esteem. Regarding depressive symptoms, our results showed that high WBI was significantly associated with higher depressive symptoms. In accordance with the studies,[7,17,25] reported that higher levels of depression were found among people who reported higher WBI and depressive symptoms are predictive of high WBI. One possible explanation is that individuals with depression may be more self-critical

and may anticipate negative judgment from others, which may lead to self-devaluation due to weight or size, which could contribute to WBI.[6,26] Our study also showed that higher perceived stress was significantly associated with greater WBI. Consistent with previous studies,[6,7,27] reported that WBI has been linked to increased stress and may contribute to individual variation in stress response; thus, people who deal with WBI have more stress. One possible explanation is that WBI is a stressful experience that is stable over time and across important areas of life[7,28]; therefore, WBI is a chronic stressor for many individuals, and those with high WBI may also be more vulnerable to experiencing daily stress.[7,27] Moreover, we also found that higher WBI is related to lower self-esteem. According to prior researches,[3,6,7] demonstrated that individuals who have lower self-esteem have high WBI. A possible reason is that adolescents who face negative experiences about their bodies and weight, such as teasing, prejudice, and

Table 2: Odds ratios and 95% confidence intervals from multinomial logistic regression for a high level of weight bias internalization

	Bivariate		Model 1		Model 2		Model 3	
	Unadjusted OR (95%CI)	P	Adjusted OR (95%CI)	P	Adjusted OR (95%CI)	P	Adjusted OR (95%CI)	P
Psychological factors								
Depression	1.67 (1.57–1.78)	<0.001	1.79 (1.63–1.96)	<0.001	1.84 (1.67–2.02)	<0.001	1.89 (1.70–2.10)	<0.001
Perceived stress	1.26 (1.22–1.30)	<0.001	1.42 (1.35–1.50)	<0.001	1.43 (1.35–1.50)	<0.001	1.45 (1.36–1.53)	<0.001
Self-esteem	0.85 (0.83–0.87)	<0.001	0.73 (0.69–0.77)	<0.001	0.73 (0.69–0.77)	<0.001	0.72 (0.68–0.76)	<0.001
Weight-related factors								
Experience of weight stigma	2.47 (1.74–3.51)	<0.001	–	–	2.96 (1.60–5.46)	<0.001	2.57 (1.36–4.85)	0.003
Body image dissatisfaction (ref: satisfied)	1.92 (1.35–2.73)	<0.001	–	–	2.23 (1.19–4.17)	0.012	2.52 (1.30–4.90)	0.006
Socio-demographic factors								
Age <20 (ref: ≥ 20, y)	1.21 (0.87–1.67)	0.262	–	–	–	–	1.16 (0.61–2.19)	0.647
Female (ref: male)	1.31 (0.94–1.82)	0.107	–	–	–	–	1.25 (0.66–2.37)	0.488
Monthly household income <8000 (ref: ≥ 8000, THB)	1.12 (0.80–1.56)	0.503	–	–	–	–	1.61 (0.86–3.04)	0.136
Friends with obesity (ref: no)	0.68 (0.49–0.95)	0.025	–	–	–	–	0.29 (0.15–0.56)	<0.001
Family members with obesity (ref: no)	0.77 (0.55–1.06)	0.117	–	–	–	–	0.73 (0.38–1.37)	0.331
Body mass index (BMI)	1.31 (1.23–1.39)	<0.001	–	–	–	–	1.42 (1.26–1.59)	<0.001

OR, odds ratio; CI, confidence interval; ref, reference group; THB, Thai baht

Table 3: Odds ratios and 95% confidence intervals from multinomial logistic regression for a moderate level of weight bias internalization

	Bivariate		Model 1		Model 2		Model 3	
	Unadjusted OR (95%CI)	P	Adjusted OR (95%CI)	P	Adjusted OR (95%CI)	P	Adjusted OR (95%CI)	P
Psychological factors								
Depression	1.35 (1.27–1.43)	<0.001	1.46 (1.34–1.59)	<0.001	1.50 (1.37–1.64)	<0.001	1.53 (1.39–1.69)	<0.001
Perceived stress	1.16 (1.13–1.20)	<0.001	1.28 (1.22–1.34)	<0.001	1.28 (1.21–1.34)	<0.001	1.30 (1.23–1.37)	<0.001
Self-esteem	0.89 (0.87–0.92)	<0.001	0.80 (0.76–0.84)	<0.001	0.79 (0.76–0.84)	<0.001	0.78 (0.74–0.83)	<0.001
Weight-related factors								
Experience of weight stigma	2.28 (1.57–3.31)	<0.001	–	–	2.83 (1.60–4.98)	<0.001	2.32 (1.29–4.16)	0.005
Body image dissatisfaction (ref: satisfied)	1.85 (1.27–2.70)	0.001	–	–	2.27 (1.26–4.09)	0.006	2.51 (1.35–4.67)	0.004
Sociodemographic factors								
Age <20 (ref: ≥20, y)	1.16 (0.82–1.66)	0.384	–	–	–	–	1.12 (0.62–2.03)	0.688
Female (ref: male)	1.28 (0.89–1.83)	0.172	–	–	–	–	1.38 (0.76–2.50)	0.286
Monthly household income <8000 (ref: ≥8000, THB)	1.06 (0.73–1.51)	0.742	–	–	–	–	1.33 (0.74–2.40)	0.335
Friends with obesity (ref: no)	0.68 (0.47–0.97)	0.034	–	–	–	–	0.34 (0.19–0.63)	0.001
Family members with obesity (ref: no)	0.78 (0.55–1.12)	0.189	–	–	–	–	0.79 (0.44–1.43)	0.454
Body mass index (BMI)	1.15 (1.08–1.22)	<0.001	–	–	–	–	1.23 (1.11–1.37)	<0.001

OR, odds ratio; CI, confidence interval; ref, reference group; THB, Thai baht

discrimination, may have a heightened risk of shame, self-blame, and poor self-worth.[7,29,30] These negative weight-based stereotypes may change the development of an individual's self-concept; that if the interpretation of self to others is inconsistent in self-concept, may result in low or decreased self-esteem, and increased WBI.[3,31] In addition, some studies suggest that the association between self-esteem and WBI might be mediated by body image. It indicates that self-esteem does not have a direct influence on WBI but rather an indirect one.[17,24,32] Therefore, individuals who had lower self-esteem were less pleased with their bodies and perceived themselves

as having a high body weight may have increased vulnerability to WBI.[24,32,33]

Furthermore, our results showed that WBI was positively associated with body dissatisfaction, which according to previous studies,[17,28] indicated that individuals with higher WBI were more likely to report worse body image and increased body dissatisfaction.[6] A possible explanation is that the potential negative impact of thin ideals and attractiveness norms on greater body dissatisfaction; in particular, if someone perceived a disparity between their ideal body size and actual body

size, this might lead to greater body dissatisfaction and WBI through the internalization of the thin-idea.[28,34,35] Moreover, the comprehensive theoretical models pointed out that the internalization of society's body ideals and appearance-related pressures are relevant contributors to the greater WBI.[36] Besides, we also found that adolescents who reported having experienced weight stigma had a greater WBI, consistent with prior studies,[24,37] stated that individuals who experience any form of weight stigmatization end up having a high WBI. It is possible that some people experience societal stereotypes about their weight. They may internalize these encounters, accept, endorse, and self-direct negative stereotypes toward themselves, which raises WBI.[5,6] Alternately, it is possible that people will retrospectively recall having more experiences with and distress over weight stigma. Thus, exposure to the experience of weight stigma increases the risk of WBI.[24,37]

In addition, our study found that BMI was strongly associated with increased WBI, and higher levels of WBI were observed across all BMI categories, especially in youths who were overweight or obese. According to previous studies,[23,25,28,38] showed that individuals who are overweight or obese will probably encounter more WBI and discrimination in their lives. Also, the most significant predictors of WBI are the highest BMI values. A possible explanation is that individuals who experience overweight or obese are vulnerable to societal bias and stigma because of their weight, leading to prejudice, stereotypes, and internalizing negative beliefs about themselves due to their weight.[7,28] Thus, they are particularly likely to be exposed to WBI.[23,27] However, some research stated that greater WBI was also present in people with underweight and normal weight[10,23]; hence, people across body weight categories may be vulnerable to high WBI.[28,38] Regarding personal contact, we found that WBI was negatively correlated with having obese peers, which is consistent with studies by Greenleaf *et al.*[30] and Alperin *et al.*,[39] reported that increased exposure and close contact with friends who were overweight or obese, which leads to less WBI. A possible explanation is that adolescents who have overweight or obese friends should be stigmatized less through the mere exposure effect; some studies suggest that greater exposure to overweight or obese people can lead to a shift in attractiveness norms and body image perception, increase tolerance and acceptance of obesity,[40] an increased likelihood of judging them to be a healthy weight, and the normalization of heavier weight. Thus, positive contact with overweight people may lead to a decreased prejudice and WBI.[39,40] Furthermore, individuals who often contact with those who are overweight or obese may minimize WBI. Because of their friendly and pleasant interactions with them, that may serve as protective social factors that lead to changes in attitudes, beliefs, and perceptions surrounding body weight, such as reducing dissatisfaction with body image and weight.[30,39]

Also, having more positive contact with others who are overweight might protect against body image concerns and potentially even buffer the effects of the WBI they face.[39]

Limitation and recommendation

This current study has some limitations. First, due to the cross-sectional design, it does not establish temporality or causality. Second, we used the WBIS-M scale for measuring WBI; thus, the findings may differ from those of other scales. However, WBIS-M is widely used in community samples and is applicable to individuals across different body weight statuses.[23] Third, our participants were drawn from youths in the community, who may have different experiences with weight stigma than adults or treatment-seeking groups. Despite these limitations, our study has the strength of a large sample size and provides a foundation to understand that WBI should be assessed with respect to weight in general and not only overweight and obese. Additionally, provides information of WBI in the community population and its association with adverse mental health outcomes and weight-related problems. Further, longitudinal studies are needed to explore the causal relationships between these factors or various physiological or biological outcomes and WBI. Also, there is a need to develop interventions to reduce WBI in youth.

Conclusion

The WBI is prevalent among adolescents across the whole weight spectrum. It was also associated with psychological factors (e.g. depressive symptoms, perceived stress, and self-esteem), weight-related factors (e.g. body image dissatisfaction and experience of weight stigma), BMI, and peers with obesity. These findings provide potential complex factors that contribute to the development of WBI, which can enable to identify youths who are at risk of WBI and develop targeted interventions to reduce WBI and prevent adverse psychological health outcomes in youths across body weights.

Ethical approval
This study was approved by the Review Ethics Boards of Mahasarakham University (ref. no. 418-428/2022).

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Conflict of interest

There are no conflicts of interest.

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