Association of Depression and Eating Disorders Among University Students in Lahore

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ABSTRACT: *Adolescence and young adulthood are the most susceptible age groups for developing eating disorders and depression, for both males and females. In this research, we aimed to study the association of depression and eating disorders in students from different universities of Lahore. It was a quantitative and cross-sectional design and the sample constituted of 327 university students of 17 to 25 years of age. Participants were selected through convenience sampling. Instruments 'Eating Attitudes Test-26' (EAT-26) and 'Center of Epidemiologic Studies Short Depression Scale-10' (CESD-10) were applied to assess presence of depression and eating disorders. A score of 20 and above on EAT-26 was considered a cut-off to determine susceptibility to eating disorders, whereas 10 or more on CESD-10 was the indicators for higher risk for depression. Descriptive statistics (mean, standard deviation, frequency and percentage) were calculated for all continuous and categorical variables. Chi square and odds ratio were applied to assess association between depression and eating disorders. The study participants had higher prevalence of depression than eating disorders (58.3% and 37% respectively). The risk of eating disorders was higher in depressed individuals, especially in young females (21 years old and younger), who also had higher susceptibility towards both depression and eating disorders. Individuals belonging to middle-income families and those who paid rent were more depressed. Significant association was seen between being a day-scholar and higher risks of eating disorders. Although, results revealed that association between eating disorders and depression were not significant (p=0.226), but depressed participants had higher chances of having eating disorders.*

Keywords: Depression, eating disorders, universities, students, middle income, risk

INTRODUCTION

Universally eating disorders (EDs) have been reported to affect majority of the adolescents, in which the larger percentage is that of girls and young females (Kavas, 2007; Costarelli et al., 2010; Shaikh and Kayani, 2014; Ozenoglu et al., 2015). In Western nations disordered eating has been reported to affect 9-22% of females (Costarelli et al., 2010).

Recent studies show that around the world, one-half of the population is at an increased risk of eating disorders, most likely in the age groups adolescence or early adulthood in both males and females (Kavas, 2007). Negativity, negative body image, decreased self-esteem, neuroticism, spontaneity, perfectionism, anxiety, depression, and psychological distress have been emphasized to be the key etiological factors in development of clinical eating disorders (Costarelli et al., 2010; Saleem et al., 2014).

Young adulthood has been proved to be a vulnerable time period for both development and prolongation of EDs through previous researches. This has been specifically observed in situations where parents have limited control or influence on eating-related behaviors (Ozenoglu et al., 2015). Also, academic stress contributes to being the dominant causative factor for disordered EA (Sanlier et al., 2008; Costarelli et al., 2010; Alvarenga et al., 2012; Witherspoon et al., 2013; Ozenoglu et al., 2015).

EDs are categorized as: anorexia nervosa (AN), bulimia nervosa (BN) and binge eating disorders (BED) and are emphasized as serious physiological and mental-health problems, significantly predominant in adolescents worldwide (Saleem et al., 2014).

Depression and EDs are interrelated and have a bi-directional relationship. Depression causes impaired EA and conversely, improper food intake and diets cause hormonal changes that consequently lead to manifestations of certain types of depression (Meireles et al., 2017). Majority of data has suggested that most patients of EDs usually also experience depression (Kavas, 2007; Ozenoglu et al., 2015; Meireles et al., 2017). Links have also been established between depressions and altered eating styles which led to poor quality of diet and higher consumption of unhealthy foods (Paans et al., 2019). Young students with higher risks of eating disorders or those who exhibit depressive symptomatology even displayed suicidal tendencies (Nascimento et al., 2019).

Much work has been recently done internationally on both depression and EDs while also critically analyzing other variables such as anxiety, stress, self-esteem, negative body image, and BMI. A few studies have investigated depression and EDs separately in Pakistan (Saleem et al., 2014). Published literature assessing the association between the two variables was scarce in Pakistan. Therefore, this

study assesses the association between depression and EDs among university students in Lahore.

MATERIALS AND METHODS

Study design

A Cross-sectional survey was designed for six months to assess association between eating disorders and depression. Six universities of Lahore both private and government sector were considered and data of participants was collected by using a standard questionnaire.

Sample size

The sample size was calculated online by selecting confidence interval 95% and confidence level as 0.05. In total, 327 students were participated in the study. 22 participants were omitted on the basis of claiming to have self-report clinical depression. Five questionnaires were not filled completely. Therefore, data from 300 students was analyzed.

Sample collection and sampling technique

Convenience sampling technique was used to approach the participants. University students from 17-25 years were considered.

Data collection procedure

The participants were given a brief introduction about the study, and were approached during the spring semester. Participants were selected on a voluntary basis. Researchers were guided for importance of the questionnaire and the importance of providing sincere answers.

Outcome measure tools with validity and reliability

The questionnaire had 3 sections i.e. demographic information form, Eating Attitude Test, and Center for Epidemiologic Studies Depression Scale.

1. Demographic information form

Demographic information including age, gender, level of education (year and semester), degree title, university, city of origin, religion, accommodation, and means of transportation, physical activity, maternal and paternal education, and number of siblings, birth order, and household income were obtained from each participant through the questionnaire.

2. Eating Attitude Test (EAT -26)

Eating Attitude Test (EAT -26) developed by David M. Garner in 1982 was used to assess and classify eating disorders (Garner et al., 1982). EAT-26 is an extensively used tool to identify high-risk cases of eating disorders. This instrument is a screening tool and does not provide diagnosis. It is a tool to recognize early appearances of behaviors and symptoms indicating the imminent presence of an eating disorder. It is the abbreviated form of

the original 40-item scale (Paans et al., 2018).Factor 1-D (13 questions) stands for 'dieting' and correlates with a distorted body image. Factor 2-B (6 questions) denotes 'bulimia and food occupation' and is associated to body weight and related issues (such as perception about one's physical self and tendency towards bulimic behavior). Factor 3-O (7 questions) means 'oral control' and provides information about tendency to self-control. High scores in factor 3 indicate low weight and absence of bulimia (Costarelli et al., 2010). The reliability of EAT-26 is high (alpha= 0.90 for Factor 1-D). EAT is useful in classifying eating disturbances in non-clinical samples. It has been validated with AN patients (Paans et al., 2018). The subjects showed their responses on a Likert scale (0=never, rarely, sometimes; 1=often; 2=usually; and 3=always). 20 is considered the cut-off score for this scale. Participants who have a score of 20 and above are the ones who have an increased risk of eating disorder, whereas scores below 20 indicate not susceptible, or a decreased risk of eating disorder (Costarelli et al., 2010; Monteleone et al., 2005).

3. Center for Epidemiologic Studies Short Depression Scale (CESD- 10)

This scale was employed to screen the subjects for depression. CESD-10 is a short version of the original 20-item CESD tool. It is a self-reporting scale that is used to identify the risk of depression among the general population. It has the reliability of alpha coefficients of 0.85 for general population samples. It has good convergent (0.91) and divergent (0.89) validity (Garner et al., 1982). The CESD is a 10-item Likert scale, and includes three questions on 'depressed affect', five questions on 'somatic symptoms', and two on 'positive affect'. Options for each statement range from "rarely or none of the time" (score of 0) to "all of the time" (score of 3). Scoring is reversed for question 5 and 8, which are 'positive affect' statements. Total scores can range from 0 to 30 (Bjorgvinsson et al., 2013). Final score is obtained by summing the 10 graded items with scores 10 or greater indicating depressed mood (Orbitello et al., 2006).

STATISTICAL ANALYSIS

Data was entered in Statistical Package for Social Sciences version 20. Descriptive statistics, which are mean, standard deviation, frequency and percentage, were calculated for all continuous and categorical variables. Chi square and odds ratio were applied to assess association between depression and ED. A p-value of 0.05 was taken as significant. In the study depression was the independent variable while eating disorders were the dependent variable.

RESULTS

The Results were entered on SPSS 20 and descriptive statistics was done.

Table 1: Descriptive Statistics of Age and Education of Participants

Data of participants	Mean	SD
Age (years)	21.8867	1.55624
Year of education	2.8733	1.28951
Current semester	5.6833	2.53069
Maternal education (years)	10.1467	5.63005
Paternal education (years)	12.3167	4.78044

Table 1 shows that mean age of the participants was 21.8867 years. Mean education year in their respective universities was 2.8733 year, mean of the semester was 5.6833, mean maternal education of the participants was 10.1467 years and the mean paternal education was 12.3167 years.

Table 2: Socio-Demographic Profile of Participants

Socio-demographic profile of participants		Frequency	Percentage
Gender	Female	132	44.0
	Male	168	56.0
City of Origin	Other	139	46.3
	Lahore	161	53.7
Religion	Other	0	0
	Islam	300	100.0
Residence Status	Hostelite	98	32.7
	Day Scholar	202	67.3
Accommodation Type	Rent	71	23.7
	Self	229	76.3
Transport	Local	103	34.3
	Bike	115	38.3
	Car	82	27.3
Income (PKR)	< 25,000	25	8.3
	25,000-50,000	82	27.3
	50,000-75,000	83	27.7
	>75,000	110	36.7

The table shows that 56% participants of the study were male and 44% were female. Also, majority of the participants (53.7%) had Lahore as the city of origin. 100% of the participants were Muslim. 67.3% participants claimed that they were day scholars while 32.7% said that they were residing in hostels. 76.3% of the participants had their own accommodations. 38.3% participants used bike as a mode of transportation. Majority (36.7%) of the participants responded that their household income was more than 75,000.
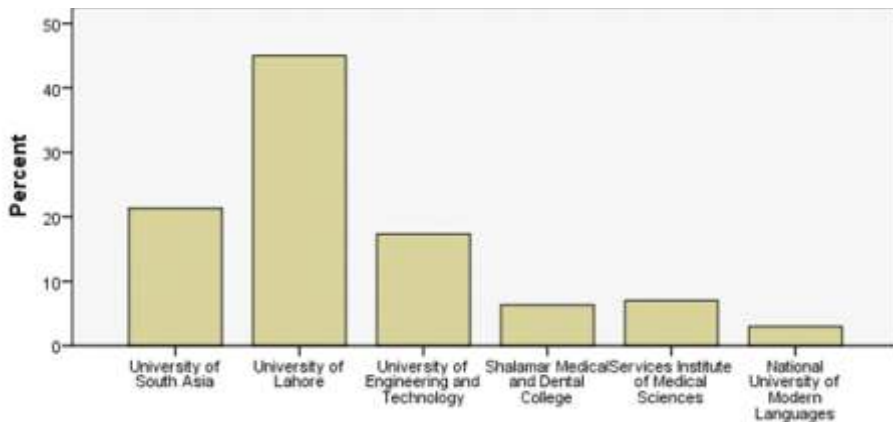

Fig. 1: Name of Universities of the Participants

The majority of the data was collected from University of Lahore (45%), while participants were also included from other universities, namely University of South Asia (21.3%), University of Engineering and Technology (17.3%), Shalamar Medical and Dental College (6.3%), Services Institute of Medical Sciences (7.0%) and National University of Modern Languages (3.0%).

Table 3: Descriptive Statistic of Center for Epidemiologic Studies Depression Scale and Eating Attitudes Test Scores

		Frequency	Mean	SD
CESD	10 or greater	175 (58.3%)	11.2333	4.88451
	Less than 10	125 (41.7%)		
EAT	20 or greater	111 (37%)	17.3733	12.26385
	Less than 20	189 (63%)		

Table 3 shows that mean CESD score of the participants was 11.2333, while the mean score for EAT was 17.3733. Out of a total of 300 participants, 175 had a score of 10 or greater on CESD, while 125 had a score of less than 10.

189 participants had less than 20 as their score on EAT, and 111 participants had a score of 20 or greater.

Table 4: Association of Depression with Eating Disorders

		EAT		OR (CI)	p-value*
		20 or greater	Less than 20	1.366 (0.845-2.208)	0.226
CESD	10 or greater	70 (40%)	105 (60%)		
	Less than 10	41 (32.8%)	84 (67.2%)		

*Chi-square

Table 4 shows that a score greater or equal to 10 increases the odds of eating disorders 1.366 times, but the association was not statistically significant.

Table 5: Association of Socio-demographic factors with Depression

Variable		Depression present	Depression absent	OR	p-value*
Age	<21	75 (61.9%)	46 (38.0%)	1.288	0.340
	>21	100 (55.8%)	79 (44.1%)		
Gender	Female	83 (62.8%)	49 (37.1%)	1.399	0.194
	Male	92 (54.7%)	76 (45.2%)		
Income	< 25,000	12 (48%)	13 (52%)		
	25,000-50,000	42 (52.5%)	40 (48.7%)	-	0.199
	50,000-75,000	54 (65%)	29 (35%)		
	> 75,000	67 (61%)	43 (39%)		
Residence status	Hostelite	59 (60%)	39 (40%)	1.122	0.708
	Day scholar	116 (57.4%)	86 (42.5%)		
Accommodation type	Rent	42 (59%)	29 (40.8%)	1.045	0.891
	Self	133 (58%)	96 (42%)		

The table shows that a large number of participants (61.9%) who were aged 21 or less years had depression as compared to those aged more than 21 years (55.8%). Also, depression was more prevalent in female participants (62.8%) than male (54.7%). Majority of the middle household income participants (65%) had depression when compared to other socioeconomic statuses. More individuals who had to pay rent had higher chances of depression than those who had their own accommodations.

Table 6: Association of Soio-Demographic Factors with Eating Disorders

Variable		Eating disorders present	Eating disorders absent	OR	p-value*
Age	<21	49 (40.5%)	72 (59.5%)	1.284	0.330
	>21	62 (34.6%)	117 (65.4%)		
Gender	Female	56 (42.4%)	76 (57.6%)	1.514	0.093
	Male	55 (32.7%)	113 (67.3%)		
Income	< 25,000	10 (40%)	15 (60%)		
	25,000-50,000	30 (36.5%)	52 (63.4%)		
				-	0.960
	50,000-75,000	32 (38.5%)	51 (61.4%)		
	> 75,000	39 (35.4%)	71 (64.5%)		
Residence status	Hostelite	28 (28.5%)	70 (71.4%)		
				0.573	0.041
	Day scholar	83 (41%)	119 (59%)		
Accommodation type	Rent	27 (38%)	44 (62%)		
				1.059	0.838
	Self	84 (36.6%)	145 (63.3%)		

*Chi-square

Table 6 demonstrates that 40.5% of participants who were 21 or less years old and 34.6% who were above 21 years old had an increased risk of having eating disorders.

Female participants also had a higher risk of having eating disorders (42.4%) as compared to male participants (32.7%). 40% individuals belonging to low socioeconomic were seen to be more prone to eating disorders as compared to other classes. However, when comparing residence statuses of the participants, it was seen that day scholars had a higher chance of having eating disorders than hostelites. The results were significant.

Table 7: Descriptive Statistics of Eating Attitudes Test (Dieting Section)

Questions	Always n (%)	Usually n (%)	Often n (%)	Sometimes n (%)	Rarely n (%)	Never n (%)
1. I am terrified about being overweight.	53 (17.7)	31 (10.3)	24 (8.0)	36 (12.0)	29 (9.7)	127 (42.3)
2. I am aware of the caloric content of foods that I eat.	40 (13.3)	48 (16.0)	46 (15.3)	31 (10.3)	41 (13.7)	94 (31 3)
3. I particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)	36 (12.0)	23 (7.7)	34 (11.3)	40 (13.3)	60 (20.0)	107 (35.7)
4. I feel extremely guilty after eating.	18 (60.)	20 (6.7)	28 (9.3)	29 (9.7)	30 (10.0)	175 (58.3)
5. I am preoccupied with a desire to be thinner.	30 (10.0)	39 (13.0)	35 (11.7)	35 (11.7)	43 (14.3)	118 (39.3)
6. I think about burning up calories when I exercise.	65 (21.7)	42 (14.0)	41 (13.7)	33 (11.0)	38 (12.7)	81 (27.0)
7. I am preoccupied with the thought of having fat on my body.	34 (11.3)	47 (15.7)	43 (14.3)	42 (14.0)	41 (13.7)	93 (31.0)
8. I avoid foods with sugar in them.	38 (12.7)	38 (12.7)	21 (7.0)	42 (14.0)	36 (12.0)	125 (41.7)
9. I eat diet foods.	28 (9.3)	24 (8.0)	24 (8.0)	32 (10.7)	47 (15.7)	145 (48.3)
10. I feel uncomfortable after eating sweets.	35 (11.7)	27 (9.0)	27 (9.0)	39 (13.0)	40 (13.3)	132 (44.0)
11. I engage in dieting behavior.	24 (8.0)	27 (9.0)	32 (10.7)	36 (12.0)	49 (16.3)	132 (44.0)
12. I like my stomach to be empty.	29 (9.7)	26 (8.7)	37 (12.3)	47 (15.7)	46 (15.3)	115 (38.3)
13. I enjoy trying new rich foods.	121 (40.3)	55 (18.3)	39 (13.0)	36 (12.0)	24 (8.0)	25 (8.3)

Majority of the participants marked 'never' for all the questions, except in question no. 13 where they gave 'always' as the answer and said that they enjoyed trying new foods.

Table 8: Descriptive Statistics of Eating Attitudes Test
(Bulimia and Food Occupation Section)

Questions	Always n (%)	Usually n (%)	Often n (%)	Sometimes n (%)	Rarely n (%)	Never n (%)
1. I find myself preoccupied with food.	22 (7.3)	33 (11.0)	58 (19.3)	60 (20.0)	54 (18.0)	73 (24.3)
2. I have gone on eating binges where I feel that I may not be able to stop.	23 (7.7)	46 (15.3)	39 (13.0)	29 (9.7)	40 (13.3)	123 (41.0)
3. I vomit after I have eaten.	16 (5.3)	9 (3.0)	22 (7.3)	23 (7.7)	30 (10.0)	200 (66.7)
4. I feel that food controls my life.	50 (16.7)	41 (13.7)	44 (14.7)	41 (13.7)	38 (12.7)	86 (28.7)
5. I give too much time and thought to food.	31 (10.3)	31 (10.3)	44 (14.7)	45 (15.0)	58 (19.3)	91 (30.3)
6. I have the impulse to vomit after meals.	17 (5.7)	18 (6.0)	17 (5.7)	24 (8.0)	30 (10.0)	194 (64.7)

24% participants marked 'never' for finding themselves preoccupied with food. 41% said that they have never gone on eating binges where they feel that they might not be able to stop. 66% individuals said that they do not vomit after eating. Also, 64% said that they do not have the impulse to vomit after meals.

Table 9: Descriptive Statistics of Eating Attitudes Test (Oral Control Section)

Questions	Always n (%)	Usually n (%)	Often n (%)	Sometimes n (%)	Rarely n (%)	Never n (%)
1. I avoid eating when I am hungry.	11 (3.7)	25 (8.3)	21 (7.0)	52 (17.3)	60 (20.0)	131 (43.7)
2. I cut my food into small pieces.	60 (20.0)	57 (19.0)	52 (17.3)	43 (14.3)	38 (12.7)	50 (16.7)

43% participants said that they never avoided eating when hungry. 35% said that they do not feel that others would prefer if they ate more. 34% also said that they do not feel that others pressure them to eat more.

Table 10: Descriptive Statistics of Center for Epidemiologic Studies Depression Scale

Questions	Rarely or None of the Time	Some or Little of the Time	Occasionally or Moderate Amount of Time	Most or All of the Time
	(Less than 1 day)	(1-2 days)	(3-4 days)	(5-7 days)
	n (%)	n (%)	n (%)	n (%)
1. I was bothered by things that usually don't bother me.	116 (38.7)	108 (36.0)	38 (12.7)	38 (12.7)
2. I had trouble keeping my mind on what I was doing.	90 (30.0)	104 (34.7)	74 (24.7)	32 (10.7)
3. I felt depressed.	88 (29.3)	108 (36.0)	63 (21.0)	41 (13.7)
4. I felt that everything I did was an effort.	54 (18.0)	85 (28.3)	93 (31.0)	68 (22.7)
5. I felt hopeful about the future.	44 (14.7)	36 (12.0)	70 (23.3)	150 (50.0)
6. I felt fearful.	140 (46.7)	86 (28.7)	49 (16.3)	25 (8.3)
7. My sleep was restless.	116 (38.7)	92 (30.7)	44 (14.7)	48 (16.0)
8. I was happy.	31 (10.3)	59 (19.7)	115 (38.3)	95 (31.7)
9. I felt lonely.	114 (38.0)	78 (26.0)	54 (18.0)	54 (18.0)
10. I could not get "going".	95 (31.7)	96 (32.0)	73 (24.3)	36 (12.0)

38% participants marked that they were rarely bothered by things that usually don't bother them.

50% said that they felt that everything they did was an effort most of the times and 46% said that they rarely felt fearful.

Table 11: Descriptive Statistics for Eating Attitudes Test

Section	No. of Questions	Max Score	Mean	S.D
Dieting	13	42	8.80	8.05861
Bulimia and Food Preoccupation	6	16	3.54	3.33845
Oral Control	7	18	5.42	3.87660

Mean score of participants on dieting section was 8.80, on bulimia and food preoccupation was 3.54 and 5.42 on the oral control section.

DISCUSSION

Depression leads to impaired eating attitudes and conversely, improper food intake and diets cause hormonal changes that subsequently lead to manifestations of certain types of depression. The study aimed to assess the association between depression and eating disorders in university students of Lahore. Analysis of literature has exhibited that depression and eating disorders are interrelated (Meireles et al., 2017). The data of 300 participants was collected from 6 different universities of Lahore, including both government and private sector universities. The majority of the data was collected from University of Lahore, while participants were also included from other universities, in a period of approximately 2 months (Fig. 1). 21 years was the mean age of the participants of the study, 56% of which were male. The mean age of participants in majority of the studies was 20 and 21 (Alvarenga et al., 2012;

Ozenogluet al., 2015; Meireleset al., 2017).The total study population data included 300 participants from which 77% were undergraduates and 23% were postgraduate students. 47.7% participants claimed that they were moderately active, 33.3% had a sedentary lifestyle. Data suggested that more of the participants were day-scholars.

The prevalence of both depression and EDs was found to be high in the participants (58.3% and 37% respectively. In a study on nutrition and Dietetic students, it was seen that a greater percentage of the participants had significantly increased scores on both EAT and BDI (Ozenoglu et al., 2015). The results also suggested an increased risk of eating disorders in participants with depression, however, the association was not statistically significant. Many previous studies also had similar results where the findings showed that depression is a factor causative of eating disorders. Thus, treating depression could reduce risk of eating disorders (Alvarenga et al., 2012; Meireleset al., 2017).

Adolescents, especially

females are more susceptible to depression. The results showed 21 or less years old female participants were more prone to depression. Other studies also favored these results and suggested that age, pubertal status and gender are key components associated with depression throughout the life span (Meireles et al., 2017). A study that also used EAT-26 revealed that from the total sample of students, more girls than boys reported having disordered eating attitudes (Yousaf et al., 2011). This study also observed depression and eating disorders with socio-demographic factors. When comparing household income of the participants to depression, the individuals belonging to middle-income families came out to be those with the highest risk of being depressed and on the other hand, individuals who did not own their houses and had to pay rent were also found to be more susceptible to depression. When compared with EDs, the study concluded that participants belonging to low- socioeconomic status were more inclined to having EDs than other classes. Also, significant association was seen in day-scholars and increased chances of EDs (p-value=0.041).

Convenience sampling was a major limitation. Random sampling techniques may have produced a different result. Along with that, the data was self-report which allowed possibility of errors on part of the participants and decrease the authenticity of the data provided. A larger sample size could have generated a significant association between the two variables. EAT-26 and CESD-10 are both screening tools for eating disorders and depression respectively and did not provide diagnoses, but susceptibility for these diseases. Further studies can benefit by including diagnostic tools and by employing interviewing techniques.

Depression and eating disorders have not been used together as variables for research in Pakistan and thus can be used as a milestone for more detailed studies in the future. Although, significant associations were not observed between the variables, higher risks and increased prevalence suggested the need for further researches using similar variables.

CONCLUSION

There was no significant association found between depression and eating disorders but depressed individual had higher incidence of eating disorders. Both variables were not associated with age and gender. An interesting fact was observed in the results which suggested that participants from middle-income socioeconomic backgrounds had an increased susceptibility to depression than high and low socioeconomic status. Moreover, there were increased chances of depression in individuals who paid rent for their accommodations than those who did not. Findings on eating disorders when compared with socio-demographic factors concluded that there was significant relationship between day-scholars and increased chances of

eating disorders. It is recommended that individuals diagnosed with depression should be screened for eating disorders and vice versa.

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Conflict of Interest Statement

The authors declare that there is no conflict of interest.

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