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Analysis of Resilience to Stress in Adolescents Student during the COVID-19 Pandemic

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ABSTRACT

Stress is a condition of worry or mental tension caused by a difficult situation, often referred to as pressure. Meanwhile, resilience comprises active and distinct biological processes that protect organisms from the effects of stress. The COVID-19 pandemic has significantly impacted mental health, specifically among adolescents navigating a transitional period. Therefore, this study aimed to determine the relationship between stress and resilience among adolescents student during the COVID-19 pandemic. An analytic cross-sectional design was used and the study was conducted between February to July 2021. The subjects comprised 238 people from 22 MAN in the Jabodetabek area, selected through Cluster Random Sampling. Primary data were obtained by filling out the 42-item Depression Anxiety Stress Scale (DASS-42) and Miller Smith Rating Scale for Stress Tolerance (MSRS-ST) online questionnaires through the Google form application. Furthermore, data were analyzed using Chi-square and Multiple logistics regression tests. The results showed that the majority of respondents totaling 185 (77.7%) had high stress levels with 202 (84.9%) having low resilience. There was a significant relationship between stress levels and resilience as demonstrated by *p-value* = 0.0002. The variable "difficulty in relaxing" had a 0.13 times potential impact as a factor associated with stress levels. On the other hand, the variable "not drinking alcohol" was found to have a 16.77 times higher potential to be a factor associated with resilience.

INTRODUCTION

Stress is a condition of worry or mental tension caused by a difficult situation, often referred to as pressure.[1] According to Weinberg and Gould, stress is characterized by an imbalance between physical and psychological demands.[2] There are three types, namely neustress, distress, and eustress. Neustress is a neutral type that does not cause any consequences for the recipient. Meanwhile, distress and eustress have negative and positive effects on the recipient respectively.[3] Various factors contribute to resilience including individual skills such as cognitive abilities, self-concept, self-confidence, and social skills. Family support comprising parental treatment and time-sharing as well as participation in community activities also play vital roles.[4]

Previous studies showed that resilience is influenced by both internal and external factors. Internal factors include spirituality, self-efficacy, optimism, and self-confidence, while external factors consist of social support.[5] Stress tolerance, on the other hand, refers to the ability of an individual to endure stressful situations while remaining rational and logical. It must be acknowledged that not everyone perceives the same events as stressful stimuli.[6]

Self-concept contributes positively to resilience, hence, the higher the self-concept, the greater the level of resilience. Individuals with high self-esteem are more optimistic, full of confidence, and always have a positive attitude even in the face of failure.[4] Furthermore, adolescence is a transitional phase of development characterized by several mental and physical changes. The occurrence of psychological changes causes confusion, resulting in a deviation from social rules and norms established in society. The main cause of physical and psychological change among young people is stress.[7]

According to various studies, the current COVID-19 pandemic has further impacted mental health. Stress level in the general population during pandemic was estimated at 29.6%.[8] Factors contributing to stress include learning assignments (70.29%), boredom at home (57.8%), boring online learning processes (55.8%), inability to meet loved ones (40.2%), signal limitations to participate in online learning (37.4%), inability to carry out usual hobbies (35.8%), as well as challenges in applying for practicum due to the lack of tools and lecture load.[9,10] Stress defense strategies used during the pandemic are to accept the present situation, carry out activities during quarantine, maintain a semblance of normalcy, recognize the benefits of being at home, and not appearing worried.[11] Based on these preceding discussions, this study aimed to investigate the relationship between stress and resilience among adolescents student during the COVID-19 pandemic.

MATERIAL AND METHOD

This was an analytic study conducted with a cross-sectional design. The population consisted of high school students in the Jabodetabek area (Jakarta, Bogor, Depok, Tangerang, Bekasi). The samples, selected using random cluster sampling comprised adolescents from 22 MAN (Madrasah Aliyah Negeri) who met the exclusion and inclusion criteria, totaling 238 based on the Lemeshow formula. This study was conducted from October to December 2021 and collaboration was carried out with OSIS through social media to collect random data for each MAN. Data were collected from the respondents using a validated questionnaire through the Google form application, distributed online. To control the quality of data, the questionnaires were not distributed at random, but through the head of each student council. Moreover, the respondents included their email address/cell phone number, ensuring that the filling was personal. The Google forms were also configured such that respondents could only submit one. The collected data were then coded and analyzed univariately using statistical applications, focusing on variable frequency distribution.

Statistical analysis was conducted using SPSS 26, with univariate analysis describing the data for each variable presented in the frequency distribution table. Subsequently, the data were analyzed with bivariate analysis to determine the relationship between all variables with the chi-square test. The multivariate analysis aimed to analyze the relationship between the independent and the dependent variables. The statistical test used was multiple logistic regression. This study assessed stress level with the DASS-42 questionnaire, while resilience was measured using MSRS-ST with a Likert scale

consisting of 20 question items. The variables examined were the characteristics of the respondents, including gender, place of residence, level of education at school, number of relatives, a family of medical personnel, families infected with COVID-19, and online learning. The dependent variable was stress level divided into normal, mild, moderate, severe, and very heavy categories. On the other hand, the independent variable was resilience to stress which consisted of high and low. This study has been reviewed by the Health Research Ethics Commission, Faculty of Medicine and Health, University of Muhammadiyah Jakarta, and obtained ethical approval No: 037/PE/KE/FKK-UMJ/II/2021.

RESULTS

The characteristics of respondents were used to determine diversity based on gender, regional domicile, number of siblings, having a health worker in the family, having a COVID-19-infected family member, and duration of online learning. Based on the results, the majority of the respondents were women (172 or 72.27%), and residing in Tangerang, (74 or 31.09). The largest number of siblings owned was two (92 or 38.67%), and a significant proportion did not have medical personnel as a family member (214 or 89.92%). Additionally, most of the respondents had no family infected with COVID-19, (209 or 87.82%), and 130 people (54.62%) engaged in online learning for 3-6 hours (Table 1).

The majority of respondents experienced high-stress levels (185 or 77.73%), with only 53 (22.37%) experiencing low levels. A significant proportion had a low level of resilience, (202 or 84.87%), while 36 (15.13%) showed a high level. Based on the result, there was a significant relationship between stress level and resilience in respondents, with a p-value of 0.002 (Table 2).

As shown in Table 2, several indicators of low resilience to stress include eating a balanced healthy diet, getting enough and regular sleep, giving and receiving love, having reliable relatives, engaging in exercise, not smoking, not drinking alcohol, adequate income, regular social participation, functional network of friends and acquaintances, good physical health, regular communication with housemates, ability to manage time, and consuming less caffeine. Meanwhile, several factors were identified as not indicative of a low level of resilience. These included balance of height and weight, religious beliefs, presence of trusted friends, frankness in expressing anxiety and anger, having personal time, and allocating time to stay at home (Table 2).

Based on Table 3, analysis results showed that several symptoms indicated a high level of stress among the respondents including being angry over trivial things, overreacting to situations, difficulty relaxing, and easily irritated. Other symptoms included feeling anxious, impatience when experiencing delays, easily irritated and angered, difficulty calming down when upset, difficulty being patient with disturbances, restlessness, inability to tolerate work interruptions, and an easily agitated attitude with a p-value of 0.0001 (Table 3).

Table 1. Characteristics of Respondents

Characteristics	n = 238	%
Sex		
Female	172	72.27
Male	66	27.73
Regional Domicile		
Jakarta	71	29.83
Bogor	37	15.55
Depok	21	8.82
Tangerang	74	31.09
Bekasi	31	13.03
Other	4	1.68
Number of Siblings		
0	13	5.46
1	78	32.77
2	92	38.67
3	25	10.50
≥ 4	30	12.60
Have a Health Worker in the Family		
Yes	24	10.08
No	214	89.92
Have the COVID-19 Infected Family Member		
Yes	29	12.18
No	209	87.82
Duration of Online Learning (Hours)		
1-3	79	33.20
3-6	130	54.62
6-8	20	8.40
> 8	9	3.78

Source: Primary Data, 2021

Table 2. The Relationship between Stress Levels and Resilience

Variable	Stress Level				Total	%	*p-value*
	Low		High				
	n = 202	%	n = 36	%			
Resilience							
Low	38	71.70	15	28.30	53	22.37	0.002
High	164	88.65	21	11.35	185	77.73	

Source : Primary Data, 2021

Table 3. Factors Affecting Stress Level

Variable	Stress Level				*p-value*
	Low		High		
	n = 53	%	n = 185	%	
Angry Over Trivial Things					
Yes	8	15.09	115	62.16	0.0001
No	45	84.91	70	37.84	
Overreacting to Situations					
Yes	2	3.78	99	53.51	0.0001
No	51	96.22	86	46.49	
It's Hard to Relax					
Yes	6	11.32	109	58.92	0.0001
No	47	88.68	76	41.18	
Easily Annoyed					
Yes	11	20.75	137	74.05	0.0001
No	42	72.25	48	25.95	
Wasting Energy on Feeling Anxious					
Yes	5	9.43	110	59.46	0.0001
No	48	90.57	75	40.54	
Can't Wait to Experience Delays					
Yes	9	16.98	96	51.89	0.0001
No	44	83.09	89	48.11	
Easily Offended					
Yes	3	5.66	107	57.84	0.0001
No	50	94.34	78	42.16	
It's Hard to Rest					
Yes	10	18.87	100	54.05	0.0001
No	43	81.13	85	45.95	
Easy to Get Angry					
Yes	2	3.77	116	62.7	0.0001
No	51	96.23	69	37.3	
It's Hard to Calm Down When You're Upset					
Yes	4	7.47	116	62.70	0.0001
No	49	92.53	69	37.30	
It's Hard to be Patient with Distractions					
Yes	2	3.77	98	52.97	0.0001
No	51	96.23	87	47.03	
Feeling Restless					
Yes	6	11.32	89	48.11	0.0001
No	47	88.68	96	51.89	
The attitude of Not Being Able to Understand Anything That Prevents Me from Completing What I'm Doing					
Yes	2	3.77	63	34.05	0.0001
No	51	96.23	122	65.95	
Anxiety Easily					
Yes	3	5.66	90	48.65	0.0001
No	50	94.34	95	51.45	

Source : Primary Data, 2021

Based on Table 4, the multivariate analysis conducted using multiple logistic regression in the initial step showed that certain variables had a significant effect ($p < 0.05$) on high stress levels. These variables included being angry about trivial matters, overreacting to situations, difficulty relaxing, having a hard time resting, spending energy on anxiety, irritability, difficulty calming down when upset, struggling with distractions, and an inability to tolerate work interruptions. Meanwhile, variables such as easily irritated, impatient during delays,

irritability, difficulty resting, restlessness, and being easily agitated had no significant effect (p>0.05). The multivariate analysis using multiple logistic regression at the end of the step showed that some variables remained significantly associated with stress levels, including anger over trivial matters, overreaction to situations, difficulty relaxing, spending energy on anxiety, irritability, difficulty calming down when upset, difficulty in tolerating distractions, and inability to tolerate work interruptions. The variable difficult to relax had the highest OR value of 0.134 (Table 4).

Based on Table 5, the multivariate analysis using multiple logistic regression in the initial step showed that several variables had a significant effect (p<0.05) on high resilience. These included warm and balanced food, sleeping 7-8 hours, having reliable relatives, exercise, not drinking alcohol, regular social participation, presence of trusted friends, good health, regular communication with house-mates, ability to manage time, and consuming little caffeine (<3 cups/day). Meanwhile, the variables of friends, networks, acquaintances, and the allocation of time staying at home, were insignificant (p>0.05). The multivariate analysis with multiple logistic regression in the final step showed that some variables remained significantly related to resilience. These included warm and balanced food, sleeping 7-8 hours, having reliable relatives, exercising, not drinking alcohol, regular social participation, presence of trusted friends, good health, regular communication with house-mates, ability to manage time, and consuming less caffeine (< 3 cups/day). The variable not drinking alcohol had the highest OR value of 16.770.

Table 4. Multivariate Analysis Model Stress Level X Factors

Variable	B	Exp (B)	95% CI for Exp (B)		*p-value*
			Lower	Upper	
Initial					
Angry over trivial things	-1.866	0.155	0.036	0.671	0.013
Overreacting to situations	-3.415	0.033	0.003	0.384	0.006
Hard to relax	-1.523	0.218	0.050	0.959	0.044
Easy to get irritated	0.439	1.551	0.317	7.578	0.588
Wasting energy to feel anxious	-2.153	0.116	0.022	0.614	0.011
Impatient with delayed experiences	-0.535	0.586	0.142	2.414	0.459
Easily offended	-1.543	0.214	0.026	1.794	0.155
Hard to rest	-1.319	0.267	0.026	1.794	0.071
Angry easily	-2.789	0.061	0.064	1.122	0.018
Hard to calm down when upset	-2.366	0.094	0.006	0.624	0.013
Hard to be patient with distractions	-2.282	0.102	0.015	0.606	0.040
Feeling restless	-1.507	0.222	0.012	0.900	0.137
The attitude of not being able to tolerate anything that prevents me from completing what is being done	-2.127	0.119	0.030	0.612	0.038
Anxiety easily	-0.591	0.554	0.016	0.886	0.622
Hard to be patient with distractions	-2.234	0.107	0.014	0.830	0.033
Intolerant to work distractions	-2.128	0.119	0.017	0.823	0.031
Final					
Angry over trivial things	-2.040	0.130	0.035	0.483	0.002
Overreacting to situations	-2.639	0.071	0.009	0.567	0.013
Hard to relax	-2.014	0.134	0.037	0.477	0.002
Wasting energy to feel anxious	-2.321	0.098	0.024	0.396	0.001
Angry Easily	-2.252	0.105	0.017	0.638	0.014
Hard to calm down when upset	-2.435	0.088	0.018	0.417	0.002
Hard to be patient with distractions	-2.234	0.107	0.014	0.830	0.033
Intolerant to work distractions	-2.128	0.119	0.017	0.823	0.031
N Observed = 238					

Source : Primary Data, 2021

Table 5. Multivariate Analysis Model of Resilience X Factors

Variable	B	Exp (B)	95% CI for Exp (B)		*p-value*
			Lower	Upper	
Initial					
Eat warm and balanced meals	2.549	12.795	2.296	71.293	0.004
Sleep duration (7-8 hours/day) at least 4 days/week	2.122	8.348	1.564	44.551	0.013
Having reliable relatives	2.922	18.580	2.859	120.738	0.002
Exercise	2.555	12.876	2.362	70.178	0.003
Don't drink alcohol	3.847	46.838	5.261	416.969	0.001
Regular social participation	1.923	6.844	1.506	31.096	0.013
Network of friends and acquaintances	21.506	2187877938	0.000	,	0.995
The existence of a trusted friend	2.896	18.102	1.214	269.872	0.036
Good health	2.002	7.4060	1.045	52.476	0.045
Regular communication with house-mate	3.645	38.301	6.119	239.736	0.000
Ability to manage time	2.098	38.301	6.119	239.736	0.000
Consume less caffeine (<3 cups/day)	2.890	18.002	2.353	137.704	0.005
Allocation of time to stay at home	1.449	4.258	0.860	21.092	0.076
Final					
Eat warm and balanced meals	1.714	5.554	1.431	21.549	0.013
Sleep duration (7-8 hours/day) at least 4 days/week	1.466	4.332	1.142	16.434	0.031
Having reliable relatives	2.492	12.080	2.730	53.443	0.001
Exercise	1.461	4.312	1,258	14.780	0.001
Don't drink alcohol	2.820	16.770	3.243	86.712	0.001
Regular social participation	1.804	6.072	1.829	20.156	0.003
The existence of a trusted friend	2.275	9.727	1.247	75.870	0.030
Good health	1.626	5.082	1.090	23.701	0.030
Regular communication with house-mate	2.494	12.105	2.931	49.992	0.001
Ability to manage time	1.995	7.350	1.921	28.115	0.004
Consume less caffeine (<3 cups/day)	2.602	13.497	2.767	65.844	0.001
N Observed = 238					

Source : Primary Data, 2021

DISCUSSION

Based on the results, the majority of respondents were female, residing in Tangerang, had two relatives, did not have medical personnel as family members, had no family members infected with COVID-19, and engaged in online learning for 3-6 hours. The differences in the characteristics compared to other studies may be attributed to the pattern of distributing questionnaires. In this study, the questionnaires were distributed online through social media, both randomly and systematically, thereby increasing the likelihood of respondents with the above-mentioned characteristics.

The results showed that stress levels among most MAN adolescent respondents fell into the high-stress level category with a percentage of 77.73% (Table 2). This value differed compared to those of previous studies. The different stress levels could be attributed to both internal factors related to how students deal with problems and external factors such as environmental, school, and family-related issues. [12] Individuals having a positive mindset towards situations, an optimistic personality, and high self-confidence are more likely to possess lower stress levels.[13]

In Palembang City, adolescents aged 18 years showed varying stress levels, with 28.65% no stress, 31.77% mild stress, 34.38% moderate stress, and 5.21% severe stress.[14] Another study on adolescents in Patrang District during online learning showed different stress levels, with the majority (52.10%) in the normal category.[15] Similarly, a study conducted at SMKN3 Bengkulu City showed that the majority (56.80%) had normal stress levels.[16]

Adolescence is a critical period associated with various life changes. During this time, adolescents must adapt to new lives and surroundings, as well as become familiar with

new people, and situations.[39] This condition causes vulnerability to high levels of stress, as observed in this study. Factors that cause high stress in adolescents include academic tasks, interpersonal relationships with others, life changes, and career exploration.[39]

In a previous study, elementary school students engaged in online learning processes during the COVID-19 pandemic showed a trend where the higher the grade level, the greater the stress level.[17] The high stress level was attributed to academic pressure, such as mounting assignments, boredom at home, and a lack of family support in completing tasks.[18] This study found similar results, where 9 out of 12 students experienced different degrees of stress.[12] However, the results differed slightly from a study conducted in India, where only 139 students out of the 336 surveyed, experienced mild stress.[19]

Other studies conducted worldwide on the general population include an investigation in Tabanan, Bali, where 29.25% of respondents aged 15-64 experienced stress at mild to severe levels.[20] In India, 97% of health workers reported stress,[19] compared to 42% of 442 in Turkey.[21] Furthermore, in China, out of 5062 health worker participants, only 1509 reported cases of stress.[22] Approximately 11.60% of the 354 general public participants in India experienced stress,[23] compared to 32% of the 1210 in China.[25]

A previous study conducted in Spain showed that 37% of the 1314 general public participants experienced stress.[24] This was in line with an Italian study where 27.15% of 2766 participants reported stress.[25] In Iraq, 17.52% of 548 participants experienced this condition.[26] Furthermore, Salari et al. showed that 29.6% of the general population reported stress during the COVID-19 pandemic.[8] Wang et al., who examined 1210 respondents from 194 cities in China reported that 8.10% had moderate to severe levels.[27] Agustin et al. also showed that 95.83% of the 71 volunteers for the COVID-19 disaster management in Indonesia experienced mild stress.[28]

In this study, most of the respondents had a low level of resilience (84.87%). This result differed compared to previous studies that measured the level of resilience in adolescents. For example, Galaresa[32] found that out of 149 high school adolescents in class XI, only 46.3%, or 69 had high resilience, while 53.7%, or the remaining 80 showed low resilience.[29] The results showed a significant relationship between stress levels and resilience (p-value 0.002), with higher stress levels, leading to lower resilience. These results were consistent with previous studies, stating that low resilience was associated with high sensitivity to anxiety and depression.[30]

Several indicators of high resilience to stress include eating a balanced healthy diet, getting enough and regular sleep, giving and receiving love, having reliable relatives, regular exercise, not smoking, not drinking alcohol, adequate income, regular social participation, having a network of friends and acquaintances, good physical health, regular communication with housemates, ability to manage time and consume less caffeine. On the other hand, factors that were not indicative of high resilience include the balance of height and weight, religious beliefs, presence of trusted friends, frankness in expressing anxiety and anger, having personal time, and allocating time to stay at home. These results were consistent with Tamarit et al. stating that the protective factors of adolescents in dealing with stress symptoms include younger age, a more elaborate house, doing voluntary work, and having romantic relationships.[31]

The bivariate analysis results indicated that symptoms showing a high level of stress in respondents included anger over trivial things, overreaction to situations, difficulty relaxing, easily irritated, spending energy to feel anxious, impatient when experiencing delays, irritability, difficulty in resting, difficulty in calming down when upset, difficulty in being patient with disturbances, feeling restless, inability to tolerate work interruptions and an easily agitated attitude, with a *p-value* of 0.0001.

Stress in adolescents often manifests in physical, emotional, cognitive, and behavioral symptoms. According to a previous study, symptoms of stress in adolescents are typically shown through changes in eating habits, signs of depression, and headaches[39]. As stated by Gaol, adolescents student with mild stress showed signs of overreacting to situations, were

sensitive, irritable, anxious, impatient, and usually felt uncomfortable when faced with delays.[32] Furthermore, Roy et al. stated that symptoms of stress showed by respondents during the COVID-19 pandemic included continuously thinking about pandemic (80%), paranoia about being infected (40%), anxiety about being alone (72%), difficulty sleeping (12%), reduced social contact (82%), avoidance of gatherings or parties (90%), avoidance of online food delivery (75%), repetitive discussion about the COVID-19 with friends (80%), and panic due to media-related news (50%).[33]

According to Muslim, symptoms of stress during the COVID-19 pandemic include excessive worrying, leading to irrational thinking and negative thoughts about infected individuals. Excessively searching for news resulted in the inability to sort out accurate information, causing anxiety, difficulties sleeping, headaches, as well as other physical pain.[34] Taylor also mentioned that psychological symptoms arising due to the pandemic include changes in thinking about health information, emotional shifts (fear, worries, anxiety), and alterations in social behavior.[35] As stated by WHO, stress during the COVID-19 pandemic was marked by fear and anxiety about health, alterations in sleep or eating patterns, difficulty concentrating, and using drugs.[36]

Following the multivariate analysis with the backward method, it was found that three factors significantly influenced stress levels in the adolescents population, namely difficulty relaxing (OR = 0.134), anger over trivial things (OR = 0.130), and being unable to tolerate work disturbances (OR = 0.119). Other significant factors include overreacting to situations, difficulty relaxing, spending energy on anxiety, irritability, difficulty calming down when upset, and difficulty being patient with distractions. As stated in various studies, stress adversely affects sleep and relaxation.[1,37] Based on the results, difficulty in resting was identified as the most influential variable, with a 0.13 times higher potential to be a factor associated with stress levels.

The multivariate analysis results with the backward method showed that the three most influential factors on resilience included not drinking alcohol (OR = 16,770), consuming little caffeine (<3 cups/day) (OR = 13,497), and regular communication with housemates (OR = 12.105). Other factors with a significant influence consisted of a warm and balanced diet, 7-8 hours of sleep, having reliable relatives, exercise, regular social participation, trusted friends, and good health.

A previous study showed that there was a relationship between alcohol abuse and high stress levels in adolescents.[38] Similar results were found in this study where high stress levels were influenced by low resilience, with alcohol consumption being one of the associated factors. The variable not drinking alcohol had a 16.77 times higher potential to be a factor associated with resilience. Another study showed the critical role of family connection in helping to prevent undesirable consequences. Spending time with family and friends was associated with reduced loneliness. According to a previous study, low resilience is more common in adolescents who have introverted personalities.[29]

The strength of this study lies in its analysis of factors influencing resilience to stress in MAN students during the COVID-19 pandemic. On the other hand, the weakness was that the subjects were not directly monitored or controlled when completing the Google forms. This study can be a reference to support further investigations in analyzing the post-pandemic impact of COVID-19 on student stress using different instruments.

CONCLUSION AND RECOMMENDATION

In conclusion, this study showed that there was a relationship between resilience and stress levels in adolescents students during the COVID-19 pandemic. Based on the result, the higher the stress level, the lower the resilience. The variable difficulty in relaxing had the highest impact on stress levels, while the variable not drinking alcohol yielded the most significant impact on resilience. Further studies are needed to examine the correlation between each aspect related to stress and resilience levels. There is also a need to measure the levels of stress and resilience in the same subjects to examine the relation or the impact of the COVID-19 pandemic.

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AUTHOR CONTRIBUTIONS

All authors played key roles in this study from the conceptualization to the writing of the manuscript. Correspondent writers played a role in compiling, designing, and analyzing the study, as well as writing manuscripts. The second author acted as a conceptualizer, while the third author functioned as a designer, analyst, and writer of the manuscript. The 4th & 5th author played the role of collecting, validating data, and writing the manuscript. All authors have read and agree to the published version of the manuscript.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

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