



RESEARCH ARTICLE

The Effect of Daytime Sleepiness Experienced by Adolescents Aged 13-18 on Quality of Life

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Abstract

Objective: It was conducted as a descriptive study to determine the effect of daytime sleepiness experienced by adolescents between the ages of 13-18 on the quality of life.

Methods: The data needed for the research were gathered online between 22 October 2022 and 25 February 2023. Adolescents aged 13 to 18-years-old made up the research study. Epworth Sleepiness Scale (ESS) and Quality of Life Scale (SF-36) were used in collecting research data for 420 adolescents between the ages of 13 and 18 years who participated voluntarily and were selected by convenience sampling method from improbable samples, with written consent from their parents, by online survey method. The statistical analysis of the data obtained in the study was performed using the SPSS 26.0 data analysis program, and the independent sample t-test, anova analysis, and pearson correlation analysis were used.

Results: It was determined that 37% of adolescents between the ages of 13 and 18 were 17-18 years-old, 57.5% were female, and 55.6% had completed high school. According to the gender and education level of the adolescents between the ages of 13 and 18, no significant difference was found in the scores of the epworth sleepiness scale and the sub-dimensions (physical role difficulty, emotional role difficulty, vitality, mental health, social functionality, pain, and general health perception) of the youth of quality of life scale ($p > 0.05$). The correlation between diurnal sleepiness and adolescents' quality of life was found to be significant ($p < 0.01$).

Conclusion: It has been determined that the relationship between the quality of life and the daytime sleepiness

experienced by adolescents. In accordance with the research results, it can be suggested to evaluate the sleep patterns and solutions of daytime sleepiness of adolescents aged 13 to 18 and to enhance the quality of life of sleep of children and families by developing sleep solutions for adolescents with daytime sleepiness.

Keywords

Adolescent, Sleep, Daytime sleepiness, Quality of life

Introduction

For proper physical development, emotional stability, behavior, and the preservation of cognitive function in adolescents, sleep, which is essential for the restoration and revitalization of the body, is also crucial [1,2]. While sleep is one of the most essential human needs for health and a healthy life, it also has a protective and curative effect on health [3,4]. People might not always get the best sleep, though. When this situation becomes permanent, various sleep problems may arise. Daytime sleepiness is one of these problems. Daytime sleepiness is one of the sleep problems that has many negative effects on health, quality of life, and daily quality of life [1,5]. Daytime sleepiness is characterized by uncontrollable drowsiness throughout the day, which causes inattention while performing important daily tasks [6]. According to the World Health Organization, quality of life is "perceiving one's own life

in a culture and value system according to one's own goals, expectations, standards, and interests" [7,8].

Sleep problems in children include waking up at night, waking up frequently, drowsiness, and sleep walking. When examining the risk factors for sleep problems, the following are particularly noteworthy. Being female, daytime dysfunction, previous sleep disorders, sleep latency, subjective sleep quality, previous physical discomfort, drowsiness while studying, excessive tea/coffee consumption, smoking, alcohol use, social, familial, physical or mental quality, gastrointestinal disturbances and appetite changes, time spent in front of television and the internet, and feeling the uncertainty of the future [6,9]. According to research [10,11], children's socioeconomic status and sleep are related. The economic characteristics of the family and the society in which they reside contribute to children's sleep problems and negatively impact their quality of life. At the same time, it has been identified as a risk factor for daytime sleepiness, which is one of the sleep problems, such as poor perception of the economic situation of children and the feeling of uncertainty about the future, and it is prevalent in adolescents aged 13 to 18 [5,12].

This study seeks to determine the impact of daytime sleepiness on the quality of life of adolescents between the ages of 13 and 18.

Research Questions

- Is there a relationship between the variables such as gender and educational status of adolescents between the ages of 13-18 and daytime sleepiness?
- Is there a relationship between the variables such as gender and educational status of adolescents between the ages of 13-18 and their quality of life?
- Is there a relationship between the effect of daytime sleepiness experienced by adolescents between the ages of 13-18 on the quality of life?

Methods

Type of research

It was conducted as a descriptive study to determine the effect of daytime sleepiness experienced by adolescents between the ages of 13-18 on the quality of life.

Place and time of research

The research was collected between 22 October 2022 and 25 February 2023 by using the online questionnaire (Google Form).

Population and sample of the research

The research population consisted of high school

students. However, since it is close to impossible to reach high school students living in Turkey, the study was created online. Adolescents who are between the ages of 13-18 and have the opportunity to access the internet were included in the study. Questionnaire was used as a data collection technique in the research, and the online questionnaire (Google Forms) was spread over social networks and social media, and many segments were tried to be reached. It was calculated on the basis of the number of variables used in multivariate data analysis in determining the sample size in the study. In this context, it was selected by convenience sampling method, one of the non-probability sampling methods. The study was conducted with 419 adolescents between the ages of 13-18 who met the conditions of participation in the study.

Inclusion/exclusion criteria for the study:

Get involved

- Adolescents who are between the ages of 13-18
- Adolescents with parental approval
- Adolescents who voluntarily agreed to participate in the study

Research exclusion criteria

- Adolescents who are outside the age range of 13-18 years.
- Adolescents without parental approval
- Adolescents who did not agree to participate in the study

Data collection tools

Research data will be collected with the following data collection forms:

- Sociodemographic data collection form for adolescents
- Epworth Sleepiness Scale (ESS)
- Quality of Life Scale (SF-36)

Socio-demographic data collection form for adolescents

This form to be filled by adolescents; it consists of a total of 3 questions about the age, gender and educational status of the adolescents.

Epworth sleepiness scale

ESS developed by MW Johns [6] was used to determine daytime sleepiness. The Turkish adaptation and validity reliability of the ESS were performed by Ağargün, et al. [13], and the Cronbach's alpha coefficient was found to be 0.80. ESS is an eight-item self-report scale that is simple to use, easy to understand, proven to be valid and reliable, in assessing the general sleepiness level in adults. It aims to evaluate the chances of falling

asleep or napping in eight different daily life situations. Each question is filled in by the individual himself to give 0-3 points. In this questionnaire, the possibility of falling asleep in certain situations on an ordinary day when the patient is not overly tired is questioned. The scoring method is the same for all questions, 0 if there is no possibility of falling asleep; 1) If there is a low probability of falling asleep; 2) If it is medium probability, and 3) If it is high probability. A person can get a score between 0-24 in ESS. "Increased daytime sleepiness" is mentioned for those with an EES value of 10 and above. In the study, it was accepted that there is a problem of daytime sleepiness with a score of 10 and above, and a score of 9 or less is absent. In this study, the ESS Cronbach's alpha coefficient was found to be 0.72.

Quality of life scale (SF-36)

The short form-36 scale was developed by Ware and Sherbourne [14] to measure health-related quality of life or health status in international studies, based on selected questions from indices and profiles used in the Medical Outcomes Study by RAND Corporation. The adaptation of the scale to Turkish was carried out by Koçyiğit, et al. [15]. The scale consists of 36 questions and consists of physical functionality (10 questions), social functionality (2 questions), physical role restrictions (4 questions), emotional role restrictions (3 questions), mental and mental health (5 questions), energy/vitality (4 questions), pain (2 questions), general health perception (5 questions). The sub-dimensions of the scale were abbreviated as physical functionality- PF, social functionality-SF, physical role restrictions-PRR, emotional role restrictions-ERR, mental health-MH, energy/vitality-E/V, general health perception-GHP, general mental health-GMH, general physical health-GPH. In the reliability studies of Koçyiğit, et al. [15], the Cronbach Alpha values of each sub-dimension were calculated separately and were found to be between 0.73 and 0.76.

Variables of the study

Independent variable: Gender, educational status

Dependent variable: Daytime sleepiness, quality of life

Evaluation of data

SPSS (Statistical Package for Social Sciences) 26.0 package program was used in the analysis of the data. Independent sample t-test, anova analysis and pearson correlation analysis were used to examine the Effect of Daytime Sleepiness Experienced by Adolescents aged 13-18 on Quality of Life.

Results

When Table 1 is examined, 37% of the adolescents between the ages of 13-18 are 17-18 years-old, 57.5% are girls and 55.6% are high school students.

Examining Table 2, the average epworth sleepiness scale score ranges from 0 to 22 points, with an average of 8.90 ± 5.07 points. The average score for physical function responses on the Quality of Life scale ranges from 0 to 100, with an average of 70.27 ± 28.55 points. The mean physical role difficulty score ranges from 0 to 100, with a mean of 59.66 ± 43.63 . Emotional Role Difficulty responses range from 0 to 100, with a mean score of 53.86 ± 45.22 . The mean score for vitality responses ranges from 15 to 90, with a mean of 56.10 ± 17.40 . The mean number for responses to mental

Table 1: Demographic information of adolescents aged 13-18.

Features	Number (n)	Percent (%)
Age		
13-14	130	31.0
15-16	134	32.0
17-18	155	37.0
Gender		
Female	241	57.5
Male	178	42.5
Educational Status		
Secondary School	99	23.6
Highschool	233	55.6
University (for the ones over 18 y/o)	87	20.8

Table 2: Distribution of epworth sleepiness scale and quality of life scale sub-dimension scores.

	Lowest	Highest	Mean	SD
Epworth Sleepiness Scale	0	22	8.90	5.07
Physical Function	0	100	70.27	28.55
Physical Role Difficulty	0	100	59.66	43.63
Emotional Role Difficulty	0	100	53.86	45.22
Life	15	90	56.10	17.40
Mental Health	28	96	59.97	18.10
Social Functioning	0	100	61.31	24.32
Pain	0	100	68.08	28.65
General Health Perception	10	90	56.66	20.96

Table 3: Examination of the relationship between epworth sleepiness scale and the sub-dimensions of the quality of life scale.

		Epworth Sleepiness Scale	Physical Function	Physical Role Difficulty	Emotional Role Difficulty	Vitality	Mental Health	Social Functioning	Pain	General Health Perception
Epworth Sleepiness Scale	r	1								
	p									
Physical Function	r	-0.276	1							
	p	0.000								
Physical Role Difficulty	r	-0.678	0.368	1						
	p	0.000	0.000							
Emotional Role Difficulty	r	-0.537	0.122	0.635	1					
	p	0.000	0.013	0.000						
Vitality	r	-0.717	0.595	0.674	0.461	1				
	p	0.000	0.000	0.000	0.000					
Mental Health	r	-0.579	0.607	0.582	0.414	0.880	1			
	p	0.000	0.000	0.000	0.000	0.000				
Social Functioning	r	-0.562	0.267	0.622	0.351	0.673	0.550	1		
	p	0.000	0.000	0.000	0.000	0.000	0.000			
Pain	r	-0.665	0.160	0.679	0.532	0.695	0.550	0.841	1	
	p	0.000	0.001	0.000	0.000	0.000	0.000	0.000		
General Health Perception	r	-0.819	0.453	0.696	0.420	0.802	0.648	0.712	0.787	1
	p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Pearson Correlation Analysis **p < 0.01

health ranges from 28 to 96, with a mean score of 59.97 ± 18.10 . The mean score for social functionality responses ranges from 0 to 100, with a mean score of 61.31 ± 24.32 . The mean pain score ranges from 0 to 100, with a mean score of $68.0828.65$. The general health perception scale has a range of 10 to 90, with an average of 56.66 ± 20.96 points.

When Table 3 is examined, there is a strong negative correlation between physical role difficulty ($r = -0.678$), vitality ($r = -0.717$), pain ($r = -0.665$), general health perception ($r = -0.819$) and epworth sleepiness scale. ($p < 0.01$). There was a weak negative correlation between physical function ($r = -0.276$) and epworth sleepiness scale ($p < 0.01$). There is a normal negative correlation between Emotional Role Difficulty ($r = -0.537$), Mental Health ($r = -0.579$), Social Functioning ($r = -0.562$) and Epworth sleepiness scale ($p < 0.01$).

When Table 4 is examined, there is a significant difference according to gender in the physical function scale of adolescents between the ages of 13-18 ($t = -2.159$; $p < 0.05$). Accordingly, it is seen that boys ($\bar{x} = 73.76$) have higher physical functions than girls ($\bar{x} = 67.70$). There is no significant difference in the scores of the epworth sleepiness scale and quality of life scale (physical role difficulty, emotional role difficulty, vitality, mental health, social functionality, pain and general health perception) scores of adolescents aged 13-18 years ($p > 0.05$).

When Table 5 is examined, there is no significant difference in the scores of the epworth sleepiness scale

and the sub-dimensions (physical function, physical role difficulty, emotional role difficulty, vitality, mental health, social functionality, perception of pain and general health) of the quality of life scale according to the educational status of the adolescents aged 13-18 ($p > 0.05$).

When Table 6 is examined, it is seen that the relationship between the independent variables and the independent variable is significant ($F(8.410) = 11.121$ $p = 0.000$ $p < 0.01$). On the other hand, it is seen that the VIF values must be below 10 in order to determine the multicollinearity problem and the Durbin Watson value must be between 0-4 in order to avoid autocorrelation. Eight variables of the quality of life scale explained 75.7% of the Epworth Sleepiness Scale variation. According to the standardized regression coefficients, the relative order of importance of the independent variables on the epworth sleepiness scale, general health perception ($\beta = -0.754$), vitality ($\beta = -0.309$), physical function ($\beta = 0.253$), pain ($\beta = 0.224$), emotional role difficulty ($\beta = -0.177$), physical role difficulty ($\beta = -0.123$), social functionality ($\beta = 0.054$) and mental health ($\beta = 0.020$). When the significance tests of the regression coefficients are examined, it is seen that only physical function ($p < 0.01$), physical role difficulty ($p < 0.01$), emotional role difficulty ($p < 0.01$), vitality ($p < 0.01$), pain and general health perception ($p < 0.01$) variables are significant predictors on the epworth sleepiness scale. As a result, it was concluded that the daytime sleepiness of 13-18 year-old adolescents affects their quality of life.

Table 4: Comparison of epworth sleepiness scale and quality of life scale sub-dimension scores by gender of adolescents aged 13-18.

	Gender	N	Mean	SD	t	p
Epworth Sleepiness Scale	Kız	241	9.08	5.03	0.829	0.408
	Erkek	178	8.66	5.14		
Physical Function	Kız	241	67.70	28.75	-2.159	0.031*
	Erkek	178	73.76	27.99		
Physical Role Difficulty	Kız	241	58.40	44.36	-0.689	0.491
	Erkek	178	61.38	42.69		
Emotional Role Difficulty	Kız	241	55.60	44.69	0.918	0.359
	Erkek	178	51.50	45.93		
Vitality	Kız	241	55.14	17.24	-1.305	0.193
	Erkek	178	57.39	17.59		
Mental Health	Kız	241	59.37	17.65	-0.792	0.429
	Erkek	178	60.79	18.71		
Social Functioning	Kız	241	60.63	24.61	-0.660	0.510
	Erkek	178	62.21	23.95		
Pain	Kız	241	67.74	29.92	-0.283	0.778
	Erkek	178	68.54	26.89		
General Health Perception	Kız	241	55.79	21.03	-0.989	0.323
	Erkek	178	57.84	20.86		

Independent Sample t-test; * $p < 0.05$

Table 5: Comparison of epworth sleepiness scale and quality of life scale sub-dimension scores of adolescents aged 13-18 according to educational status.

	Group	N	Mean	SD	F	p	Dif
Epworth Sleepiness Scale Physical Function	Secondary School	99	9.15	5.18	0.359	0.699	
	Highschool	233	8.93	5.17			
	University (the ones over 18 y/o)	87	8.52	4.72			
Fiziksel Fonksiyon Physical Role Difficulty	Secondary School	99	68.78	29.26	0.396	0.674	
	Highschool	233	70.08	28.95			
	University (the ones over 18 y/o)	87	72.47	26.83			
Emotional Role Difficulty vitality	Secondary School	99	59.34	43.38	0.014	0.986	
	Highschool	233	59.98	43.23			
	University (the ones over 18 y/o)	87	59.19	45.45			
Emosyonel Rol Güçlüğü Mental Health	Secondary School	99	50.17	46.01	1.611	0.201	
	Highschool	233	57.37	44.57			
	University (the ones over 18 y/o)	87	48.66	45.69			
Social Functioning Pain	Secondary School	99	54.59	17.99	0.674	0.510	
	Highschool	233	56.93	17.59			
	University (the ones over 18 y/o)	87	55.58	16.24			
Ruhsal Sağlık General Health Perception	Secondary School	99	58.26	18.09	0.622	0.537	
	Highschool	233	60.69	18.16			
	University (the ones over 18 y/o)	87	60	18.01			
Epworth Sleepiness Scale Physical Function	Secondary School	99	58.46	25.18	1.714	0.181	
	Highschool	233	63.25	24.25			
	University (the ones over 18 y/o)	87	59.34	23.28			
Ağrı Physical Role Difficulty	Secondary School	99	64.92	29.66	0.882	0.415	
	Highschool	233	69.48	28.53			
	University (the ones over 18 y/o)	87	67.90	27.79			
Emotional Role Difficulty	Secondary School	99	54.39	21.03	0.954	0.386	
	Highschool	233	56.91	20.57			
	University (the ones over 18 y/o)	87	58.56	21.90			

ANOVA Analysis

Table 6: Comparison of epworth sleepiness scale and quality of life scale sub-dimension scores of adolescents aged 13-18.

Variable	B	SD	β	t	p	VIF	F	F significance
Constant	19.329	0.486		39.750	0.000		159.275	0.000**
Physical Function	0.045	0.006	0.253	7.025	0.000	2.190		
Physical Role Difficulty	-0.014	0.005	-0.123	-2.929	0.004	2.949		
Emotional Role Difficulty	-0.020	0.004	-0.177	-5.136	0.000	2.010		
vitality	-0.090	0.020	-0.309	-4.395	0.000	8.315		
Mental Health	0.006	0.015	0.020	0.367	0.714	4.888		
Social Functioning	0.011	0.010	0.054	1.106	0.270	4.014		
Pain	0.040	0.011	0.224	3.577	0.000	6.600		
General Health Perception	-0.182	0.013	-0.754	-14.517	0.000	4.539		

Multiple Linear Regression Analysis **p < 0.01

Dependent: Epworth Sleepiness Scale R = 0.870

Corrected R2 = 0.757

Durbin Watson = 1.245

Discussion

In our study examining the effect of daytime sleepiness experienced by adolescents between the ages of 13-18 on the quality of life, variables such as gender and class status are important. When the sociodemographic information results of the participants were examined, it was stated that 37% were 17 to 18-years-old, 57.5% were female, and 55.6% had completed high school education. Our results are similar to the sociodemographic data of the studies of sleep deprivation in high school students in the United States by Meldrum and Restivo [1] and the study of sleep and risk-taking behavior in adolescents by O'Brien and Mindell [16]. Similarly, the results of Koçolu and Arslan's [12] study on daytime sleepiness and related factors in high school students are similar.

In the results of examining the relationship between the epworth sleepiness scale and the sub-dimensions of the quality of life scale of adolescents between the ages of 13 and 18, a strong negative correlation was found. These results demonstrate that sleep deprivation and inadequate sleep duration are also prevalent among students, and it is stated that daytime sleepiness is directly related to life quality [10,17]. The results of an urban sleep behavior study conducted by Spilsbury, et al. [18] on children in school age in the United States are similar. According to the gender of the adolescents aged 13 to 18, it was concluded that there was no significant difference between the scores of the Epworth sleepiness scale and the sub-dimensions (physical role difficulty, emotional role difficulty, vitality, mental health, social functionality, pain, and general health perception) of the quality of life scale. The results of Kocoglu, et al.'s [19] study titled "Second Level Students' Sleep Habits and the Effect of Gender Problems on Some School Functions" determined that the gender factor did not negatively influence sleep and daily activities. The results of the study titled "Sleep, Sleep Disorder, and Fertility in Women" conducted by Kloss, et al. [20] concluded that the gender variable did not affect the daily life quality of the daytime sleepiness and there was no relationship between them, except in cases where the sleep was irregular only during the fertile periods. In Telzer, et al.'s [21] study on the effects of poor sleep quality on brain functions and risk taking in adolescence, it was concluded that there was no relationship between gender and activities of daily living like academic achievement and social success. In other studies, it is stated that the daytime sleepiness prevalence is higher and that the sleep quality of female students is inferior to that of male students [22]. In addition, it is known [23] that being female is a significant risk factor for increased daytime sleepiness [12]. However, it was determined in the study that the gender of adolescents had no bearing on its effect on daytime sleepiness and quality of life.

It was concluded that there was no difference in

the scores of the epworth sleepiness scale and quality of life scale sub-dimensions (physical function, physical role difficulty, emotional role difficulty, vitality, mental health, social functionality, pain, and general health perception) of adolescents between the ages of 13 and 18 according to their educational status. According to these findings, Brouillette, et al. [24] found that girls and boys slept better than boys and girls, and students with the same level of education woke up comfortably in the mornings when they slept intermittently at night, and it had no negative effect on their quality of life. It is concluded that the education status of the students does not affect their sleep quality, but the sleeping hours do affect their daytime napping status in the study by Merikanto, et al. [25]. Late bedtime diminishes school performance and predisposes adolescents to health hazards. The study by Koulouglioti, et al. [26] on insufficient sleep and intentional injuries in young children concluded that sleep quality was unrelated to the variable of education status and did not affect their activities in social life.

It was determined that the epworth scale and quality of life sub-dimension scores of adolescents aged 13 to 18 were significant, i.e., the daytime sleepiness of adolescents aged 13 to 18 affected their quality of life. Inadequate, poor sleep quality frequently impairs cognitive control during adolescence and results in problems such as daytime sleepiness. Sleep is particularly essential for learning and memory, as well as for controlling emotions, interests, and behaviors [27,28]. For instance, in a study conducted in Finland, it was determined that students who go to bed after 22:00 have less ability and motivation to complete their school duties, do their homework, and prepare for exams than those who go to bed earlier, so they frequently take naps during the day and cannot spare time for their social lives [25]. In another study, it is stated that sleep problems caused by using social media have an effect similar to experiencing work fatigue in students, and they are inclined to sleep during the day. The researchers interpreted this result as having a negative impact on the learning efficacy and academic performance of students, as well as their peer group relationships [29]. Another study determined that adolescents with excessive daytime sleepiness had lower academic achievement [30]. Another study conducted with high school students found that sleeping habits such as sleeping after 22:00 at night and waking up before 8:00 in the morning were a risk factor for daytime sleepiness and negatively affected their quality of life [12]. Due to depression and anxiety, children with social and familial problems typically have poorer sleep quality. Because of this, they experience sleep problems such as waking up frequently at night and taking naps during the day [31,32]. The dysfunction in the family structure is one of the most significant causes of sleep disorders. If the family, which is one of the most

important factors in the student's success, is unable to provide the necessary environment for the student and the student is uncomfortable in the situation he is in, the student's anxiety and inability to find a solution may have created a cognitive problem for the student. Due to sleep disorders, this results in problems with students' quality of life [33,34].

Conclusion

It has been determined that the relationship between the quality of life and the daytime sleepiness experienced by adolescents. Adolescents' psychosocial health, peer-teacher relationships, daily activities, and family interactions are all negatively impacted by poor sleep quality. According to the research results, it can be suggested to evaluate the sleep patterns and quality of life of adolescents aged 13 to 18 and to enhance the quality of sleep of adolescents and families by developing solutions for adolescents with daytime sleepiness. In order to generalize the results, it is believed that examining the results and quality of life of studies with samples representing other education levels will be beneficial.

Limitations

Adolescents in the 13-18 age group were included in the study. Research results can only be generalized to the sample group in the study.

Conflict of Interest Statement

There is no declaration of conflict of interest.

Ethical Aspect of Research/Ethical Approval Statement

Permission was obtained via e-mail with the Epworth Sleepiness Scale (ESS), validated and reliable by Ağargün, et al. [13], and the Quality of Life Scale (SF-36), validated and reliable by Koçyiğit, et al. [3]. Permission was obtained from Hakkari University Scientific Research and Publication Ethics Committee (IRB:2022/91-1) for the research. Identity information was not obtained or shared in any way from the parents. In order not to cause ethical violations within the scope of the research, informed consent was obtained from the parents.

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There was no financial support, and the research was carried out in line with the possibilities of the researchers.

Author Contributions

Generating an idea or hypothesis for research and/or article; ÇMH, DDK, NAB, MZA, MRG. planning methods to achieve results: ÇMH, DD, NAB. Supervision and responsibility for the organization and course of the article: ÇMH. taking responsibility for the logical explanation and presentation of the findings: ÇMH,

MZA. Taking responsibility for the creation of the whole article or the main part: ÇMH, MRG. Before submitting the article, rework not only in terms of spelling and grammar, but also in terms of intellectual content: ÇMH.

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