Quality of Sleep among General Governmental Secondary School Students in Abha City, Saudi Arabia

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Abstract

Aim of the study: To investigate sleep quality and its associates among secondary school students in Abha City.

Subjects and Methods: A total of 400 secondary school students (200 males and 200 females) in Abha City were included. The Arabic versions of the Pittsburgh Sleep Quality Index and the Athens Insomnia Scale were applied in addition to the socio-demographic and personal characteristics of the participants.

Results: A total of 171 students (42.8%) had poor quality of sleep, while 177 students (44.3%) had insomnia. Prevalence of poor sleep quality was significantly higher among females than males (48% and 37.5%, respectively, p=0.034), and among smokers more than non-smokers (48.8% and 41.3%, respectively, p=0.048), while it did not differ significantly according to students' age, nationality, midterm exam grades, consumption of soft drinks at night, or any of students' family characteristics. Insomnia significantly increased with students' age (p=0.001), while it did not differ significantly according to students' gender, nationality, midterm exam grades, consumption of soft drinks at night, smoking status, or their family characteristics.

Conclusions: Poor sleep quality and insomnia are common among secondary school students in Abha City. Females and cigarette smokers are more prone to poor sleep quality. Insomnia among secondary school students is significantly associated with older age.

Recommendations: The school health program should apply anti-smoking control and health education programs at schools. Parents and teachers should guide children toward regulating their sleep and wake-up times. Delaying school start times may be proposed as a means of allowing students to get adequate sleep.

Key words: Sleep quality,
Secondary School Students,
Pittsburgh Sleep Quality Index,
Athens Insomnia Scale.

Introduction

Adequate sleep in adolescence is important for healthy development and proper daytime functioning. The evidence suggests that disturbances in the quantity and quality of sleep are associated with emotional and behavioral problems, somatic complaints, and overall quality of life among adolescents (1-7).

Sleep is crucial for the learning, memory processes, and school performance of adolescents (8). Adequate sleep has been shown to boost the immune system, which helps to fight infections; thus, sleep may reduce a child's risk of getting sick (9). The psychological health of adolescents can be affected by sleep duration, with shorter sleep durations in adolescents having been linked to depression and an increase in suicide ideation (10).

According to the National Sleep Foundation, in Arlingon, Virginia, USA, the recommended sleep duration for adolescents is 9 hours per night for optimum health and development. Sleep duration is not the only indicator of sleep. Sleep quality and excessive daytime sleepiness are significant indicators of sleep outcome. Sleep quality refers to continuous sleep without any interruption (11).

Sleep disorders are considered when there is repeated difficulty with the initiation, duration, maintenance, or quality of sleep that occurs despite adequate time and opportunity for sleep and results in some form of daytime impairment (1).

Good sleep quality can be characterized by the occurrence of certain conditions such as the early onset of sleep, fewer interruptions, and fewer early awakenings. Good sleep quality is also associated with a wide range of positive outcomes such as better health, greater well-being, and better psychological functioning among adolescents (12). Inadequate or disrupted sleep can directly result in excessive daytime sleepiness. Adolescents with daytime sleepiness are likely to experience reduced alertness, compromised daytime functioning, and impaired mood (3, 13-14).

Since insufficient sleep, poor sleep quality and sleepiness are common problems in children and adolescents, being related to learning, memory and school performance, (3-4) the present study aimed to investigate sleep quality and its associates among secondary school students in Abha City, Saudi Arabia.

Subjects and Methods

This study was conducted during the academic year 2018-2019 at general secondary governmental schools in Abha City, Saudi Arabia.

Study design:
A cross-sectional analytical study design was followed. A multistage stratified random sample was applied by selecting schools and students from the Directorate of Education in Abha City. Four governmental general secondary schools were ran¬domly selected (two for boys and two for girls) by drawing the names of schools from the sampling frame. After that, five classes of students were randomly selected from each school using a simple random sampling technique (one class for the first scholastic grades; two classes for the second scholastic grade (one Scientific branch and one Arts branch); and two classes for the third scholastic grade (one Scientific branch and one Arts branch). All students in a selected class were invited to participate in the study. A total of 400 students (200 boys and 200 girls) were included in this study.

A study questionnaire was designed by the researchers. It included three parts as follows:
1- Socio-demographic characteristics: Student's age, parental education and occupation, number of siblings, nationality, smoking status, intake of certain beverages before sleep (i.e., tea, coffee, soft drinks, power drinks), use of mobile phones at night, past history of any medical or psychiatric disorders.
2- The Arabic version of Pittsburgh Sleep Quality Index (PSQI): It measures the quality and patterns of sleep. It differentiates "poor" from "good" sleep by measuring seven areas: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction over the last month. Scoring of answers is based on a 0 to 3 scale, whereby 3 reflects the negative extreme on the Likert Scale. A global sum of "5" or greater indicates a "poor" sleeper. Reliability and validity of PSQI produced a sensitivity of 89.6% and a specificity of 86.5% of patients versus control subjects. This cutoff score correctly identified 84% of patients with disorders of initiating or maintaining sleep, 89% of patients with disorders of excessive sleepiness, and 97% of depressed patients (15) .
3- The Arabic version of Athens Insomnia Scale: This is a validated self-assessment psychometric instrument designed for quantifying sleep difficulty based on the ICD-10 criteria. It consists of eight items; the first five pertain to sleep induction, awakenings during the night, final awakening, total sleep duration, and sleep quality; while the last three refer to well-being, functioning capacity, and sleepiness during the day. Regarding internal consistency, Cronbach's alpha was around 0.90 and the mean item-total correlation coefficient was about 0.70. Moreover, in the factor analysis, the scale emerged as a sole component. The test-retest reliability correlation coefficient was found at almost 0.90 at a 1-week interval. As far as external validity is concerned, the correlation of the Athens Insomnia Scale with the Sleep Problems Scale was 0.90. A score of 6 as the optimum cut-off based on the balance between sensitivity and specificity. When diagnosing individuals with a score of 6 or higher as insomniacs, the scale presents with 93% sensitivity and 85% specificity (90% overall correct case identification). For this cut-off score, in the general population, the scale has a positive predictive value of 41% and a negative predictive value of 99% (16).

A pilot study was carried out, on a purposive sample of 30 secondary school students (15 boys and 15 girls) from schools that were not included in the main study. Their data were used for testing the feasibility of the study and to assess clarity of questions. However, these data were not included into the main data of the study.

This study was fully self-funded by the researchers. Prior to data collection, all the necessary official approvals were fulfilled. During data collection, participant students were informed that their responses were considered fully confidential and anonymous, and any student was free to withdraw from participating in this study at any time without being exposed to any penalty. The researchers then collected the completed questionnaire sheets.

Data entry and analysis were performed using the Statistical Package for Social Sciences (SPSS version 23). Descriptive statistics were calculated, in the form of frequency and percentage for categorical data. Testing significance was performed by applying the chi-square test. Differences were considered as statistically significant when the p-values were less than 0.05.

Results

Table (1) shows that the age of about one quarter of students (28.7%) was 15-16 years, while about two thirds of them (64.3%) were aged 17-18 years and 7% were more than 18 years old. Most participant students were Saudi (73%). About one quarter of students (24.8%) obtained excellent grades in their midterm exam, 31.5% had very good grades, while 3% failed. About one third of students (34.3%) used to have certain beverages (i.e., Soft drinks, power drinks, coffee or tea) at night, while 8.5% of students were smokers.

Table (2) shows that about half of students (46.8%) had 1-2 siblings, while 33.3% had 3-4 siblings. The educational level of most students' fathers was either secondary (25.8%) or university (41.8%). On the other hand, 13.3% of mothers were illiterate, 15.5% had primary education, 15.3% had secondary education and 39.3% had university education. Almost one third of students' fathers were retired (31%) and 30.3% were military personnel, and that of 4.3% was health-related. About one third of students' mothers (31.8%) were employed. The monthly family income of almost half of students (47.8%) was ≥10,000 SR.

Figure (1) shows that 171 students (42.8%) had poor quality of sleep.

Table (3) shows that prevalence of poor sleep quality was highest among students aged 17-18 years (43.6%). However, quality of sleep did not differ significantly according to students' age groups. Prevalence of poor sleep quality was significantly higher among female than male students (48% and 37.5%, respectively, p=0.034). Prevalence of poor sleep quality was higher among Saudi students than non-Saudi students (43.2% and 41.7%, respectively). However, quality of sleep did not differ significantly according to students' nationality. Prevalence of poor sleep quality was highest among students who failed at their midterm exam. However, quality of sleep did not differ significantly according to students' grades at their midterm exam. Prevalence of poor quality of sleep was higher among students who consume soft drinks at night than those who do not (44% and 42.1%, respectively). However, students' quality of sleep did not differ significantly according to their consumption of soft drinks at night. Prevalence of poor quality of sleep was significantly higher among students who smoke cigarettes than those who do not smoke (58.8%, 41.3%, respectively, p=0.048).

Table (4) shows that students' quality of sleep did not differ significantly according to their family characteristics

Figure (2) shows that 177 students (44.3%) had insomnia.

Table (5) shows that prevalence of insomnia among secondary school students significantly increased with their age group (p=0.001). However, prevalence of insomnia did not differ significantly according to their gender, nationality, grades of their midterm exam, or consumption of certain beverages (i.e., soft drinks, power drinks, tea or coffee) at night or smoking status.

Table (6) shows that students' quality of sleep did not differ significantly according to their family characteristics.

Table 1: Personal characteristics of study sample

Personal characteristics	No.	%
Age (years)		
• 15-16 years	115	28.7
• 17-18 years	257	64.3
• > 18 years	28	7.0
Nationality		
• Saudi	292	73.0
• Non-Saudi	108	27.0
Midterm Grade		
• Fail	12	3.0
• Pass	19	4.8
• Good	144	36.0
• Very Good	126	31.5
• Excellent	99	24.8
Intake of certain beverages at night[1]	141	35.3
Smoking cigarettes	34	8.5

(1) Soft drinks, power drinks, coffee or tea

Figure 1: Students' sleep quality

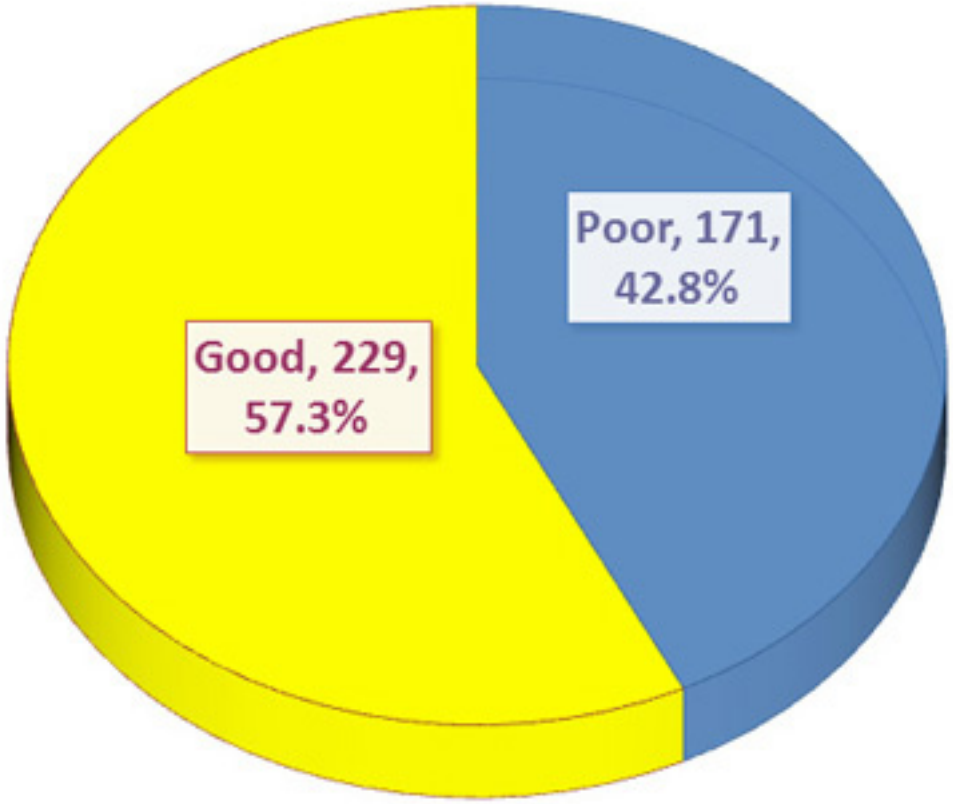

Table 2: Family characteristics of study sample

Family characteristics	No.	%
No. of siblings		
• 0	28	7.0
• 1-2	187	46.8
• 3-4	133	33.3
• 5+	52	13.0
Father's educational level		
• Illiterate	22	5.5
• Primary	51	12.8
• Intermediate	57	14.2
• Secondary	103	25.8
• University	167	41.8
Mother's educational level		
• Illiterate	53	13.3
• Primary	62	15.5
• Intermediate	61	15.3
• Secondary	67	16.8
• University	157	39.3
Father's occupation		
• Retired	124	31.0
• Military	121	30.3
• Governmental	60	15.0
• Health related	17	4.3
• Private sector	46	11.5
• Others	32	8.0
Mother's employment		
• Unemployed	273	68.3
• Employed	127	31.8
Monthly family income		
• <10000 SR	209	52.3
• ≥10000 SR	191	47.8

Table 3: Students' quality of sleep according to their personal characteristics

Personal characteristics	Good		Poor		p value
	No.	%	No.	%	
Age (years)					
• 15-16 years	67	58.3	48	41.7	
• 17-18 years	145	56.4	112	43.6	
• > 18 years	17	60.7	11	39.3	0.879
Gender					
• Male	125	62.5	75	37.5	
• Female	104	52.0	96	48.0	0.034
Nationality					
• Saudi	166	56.8	126	43.2	
• Non-Saudi	63	58.3	45	41.7	0.790
Midterm exam grade					
• Fail	3	25.0	9	75.0	
• Pass	12	63.2	7	36.8	
• Good	87	60.4	57	39.6	
• Very Good	69	54.8	57	45.2	
• Excellent	58	58.6	41	41.4	0.174
Intake of certain beverages at night(1)					
• Yes	79	56.0	62	44.0	
• No	150	57.9	109	42.1	0.716
Smoking status					
• Smoker	14	41.2	20	58.8	
• Nonsmoker	215	58.7	151	41.3	0.048

(1) Soft drinks, power drinks, coffee or tea

Figure 2: Prevalence of insomnia among students

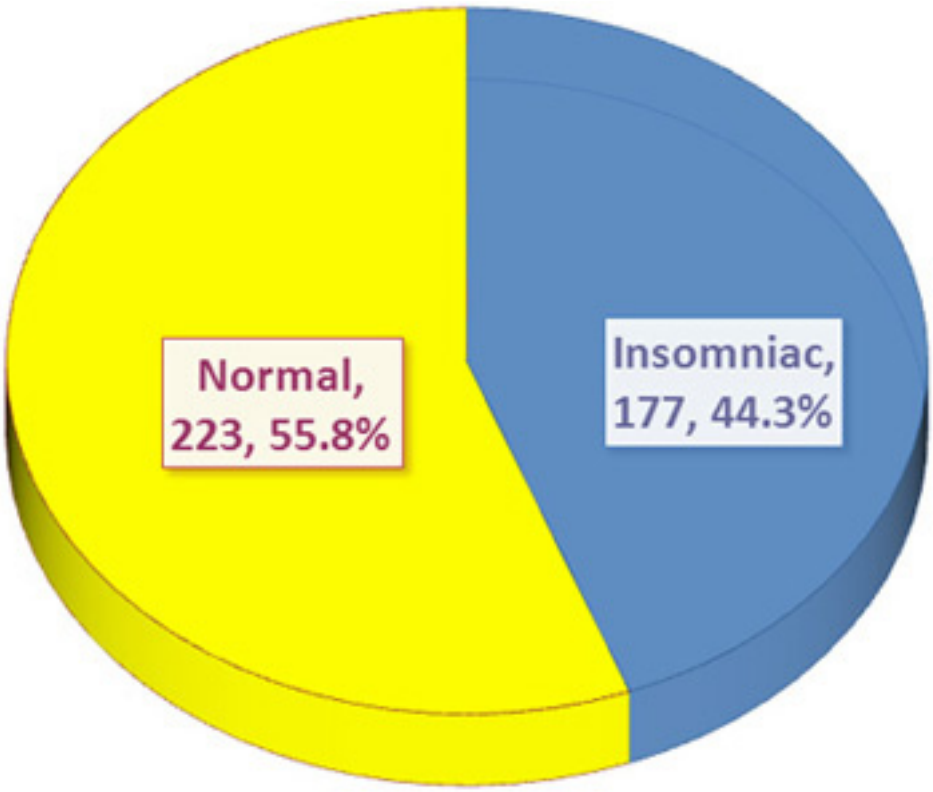

Table 4: Students' quality of sleep according to their family characteristics

Family characteristics	Good		Poor		p value
	No.	%	No.	%	
No. of siblings					
• 0	13	46.4	15	53.6	
• 1-2	118	63.1	69	36.9	
• 3-4	68	51.1	65	48.9	
• 5+	30	57.7	22	42.3	0.112
Father's educational level					
• Illiterate	11	50.0	11	50.0	
• Primary	27	52.9	24	47.1	
• Intermediate	31	54.4	26	45.6	
• Secondary	57	55.3	46	44.7	
• University	103	61.7	64	38.3	0.637
Mother's educational level					
• Illiterate	24	45.3	29	54.7	
• Primary	35	56.5	27	43.5	
• Intermediate	35	57.4	26	42.6	
• Secondary	38	56.7	29	43.3	
• University	97	61.8	60	38.2	0.349
Father's occupation					
• Retired	57	46.0	67	54.0	
• Military	75	62.0	46	38.0	
• Governmental	36	60.0	24	40.0	
• Health related	12	70.6	5	29.4	
• Private sector	27	58.7	19	41.3	
• Others	22	68.8	10	31.3	0.057
Mother's employment					
• Unemployed	159	58.2	114	41.8	
• Employed	70	55.1	57	44.9	0.557
Monthly income					
• <10000 SR	111	53.1	98	46.9	
• >10000 SR	118	61.8	73	38.2	0.080

Table 5: Prevalence of insomnia among students according to their personal characteristics

Personal characteristics	Normal		Insomnia		p value
	No.	%	No.	%	
Age (years)					
• 15-16 years	79	68.7	36	31.3	
• 17-18 years	134	52.1	123	47.9	
• > 18 years	10	35.7	18	64.3	0.001
Gender					
• Male	110	55.0	90	45.0	
• Female	113	56.5	87	43.5	0.763
Nationality					
• Saudi	156	53.4	136	46.6	
• Non-Saudi	67	62.0	41	38.0	0.124
Midterm Grade					
• Fail	9	75.0	3	25.0	
• Pass	12	63.2	7	36.8	
• Good	83	57.6	61	42.4	
• Very Good	62	49.2	64	50.8	
• Excellent	57	57.6	42	42.4	0.313
Intake of certain beverages at night(1)					
• Yes	77	54.6	64	45.4	
• No	146	56.4	113	43.6	0.735
Smoking status					
• Smoker	14	41.2	20	58.8	
• Nonsmoker	209	57.1	157	42.9	0.074

(1) Soft drinks, power drinks, coffee or tea

Discussion

This study revealed that 42.8% of secondary school students in Abha City had poor quality of sleep, while 44.3% had insomnia.

Quach et al. (17) reported that sleep problems among schoolchildren are common. However, several studies reported different rates for sleep problems among school children. Amintehran et al. (18) reported that sleep problems are experienced by 25-30% of adolescents in Tehran, Iran. In Istanbul, Turkey, Dag and Kutlu (19) found that 36.4% of secondary school students had poor sleep quality. In Gombak district, Selangor, Malaysia, Kesintha et al. (20) reported that prevalence of poor sleep quality among secondary school students was 24%. In USA, Wheaton et al. (21) reported that secondary school students did not sleep enough hours, experienced poor sleep quality, and experienced negative consequences for these behaviors.

The consistency between findings of the present study and those of several other studies in different countries, with different cultures, indicate that poor sleep quality is a common and important public health problem that necessitates urgent attention.

Hirshkowitz et al. (22) emphasized that adolescents aged 14–17 years should sleep 8–10 hours per night. The Adolescent Sleep Working Group (23) recommended that to help ensure that adolescents get adequate sleep, they can practice good sleep hygiene (i.e., habits that promote good sleep). Early school start times contribute to insufficient sleep among adolescents. Delaying school start times has been proposed as a means of allowing adolescents to get adequate sleep.

Results of the present study showed that prevalence of poor sleep quality and insomnia differed significantly according to some personal characteristics, but they did not differ significantly according to students' family characteristics, nationality, or their grades of midterm exam.

Findings of this study showed that prevalence of poor quality of sleep was significantly higher among female secondary school students in Abha City.

This finding is in accordance with that reported by Dag and Kutlu (19), in Istanbul, Turkey, who reported that prevalence of poor quality of sleep among female secondary school students was significantly higher than that among male students (43.9% and 30.9%, respectively, $p<0.01$). Kesintha et al. (20), in Malaysia, who reported that prevalence of

poor quality of sleep among female secondary school students was significantly higher than that among male students (28.1% and 21.3%, respectively, p=0.012).

Hysing et al. (24) stated that, during adolescence, there is increased prevalence of insomnia among females. This higher prevalence of insomnia among females has been explained by Krishnan et al. (25), who noted that, there is no difference between boys and girls in incidence of insomnia before puberty. However, during adolescence, there is more increase in incidence of insomnia among girls than among boys. Moreover, females usually report more sleep-related complaints (26).

Results of this study showed that 8.5% of secondary school students were cigarette smokers. Prevalence of poor quality of sleep was significantly higher among secondary school students who smoke.

This finding is in agreement with those reported by several studies in developing countries, especially Saudi Arabia. Fida and Abdelmoneim (27) noted that despite its decline in developed countries, the rate of smoking in developing countries is still high. Bassiony (28) reported that prevalence of current smoking among school students ranged from 12% to 29.8%. Almutairi (29) noted that prevalence of smoking is high among Saudi students. Mandil et al. (30) added that cigarette smoking is increasing among young people, especially in Gulf nations such as Saudi Arabia.

Therefore, these findings should ring a warning bell that smoking may constitute a sweeping pandemic among adolescents in Saudi Arabia.

Gillum et al. (31) noted that it is interesting to observe how a conservative society such as the Saudi society, where smoking was socially, traditionally, and above all religiously banned, has been affected by the tobacco smoking pandemic to reach such high prevalence levels.

Several studies explained the relationship between tobacco use and sleep problems and difficulties. Hamidovic and de Wit (32) showed that smoking disrupts sleep in two ways. First, as bedtime approaches, the smoker has a final “relaxing” smoke before retiring. That smoke may seem relaxing, but nicotine is actually a stimulant, and smoking cigarettes is almost as sleep disrupting as drinking a cup of coffee. Moreover, smoking disrupts sleep in yet another way. During the night, the smoker goes hours without a cigarette. This leads to discomfort and mild withdrawal, making it difficult to fall into a deep sleep. The light sleep is not sufficient for the smoker to awake refreshed (and struggle with his smoker’s cough) in the morning. Isa and El-Sabbagh (33) added that smoking cigarettes causes various respiratory problems and diseases which affect sleep.

Fida and Abdelmoneim (27) argued that, nowadays, about half of the population in Saudi Arabia is thought to be smokers and the country ranks fourth in cigarette import worldwide, with an annual increase of around 3% of tobacco consumption. Meanwhile, there are no regulations to prevent Saudi youth from purchasing or using tobacco, which is being freely sold at a relatively low cost.

The current study revealed that prevalence of insomnia significantly increased with students’ age.

Similarly, Jiang et al. (34) found that that prevalence of sleep problems increases with age of adolescents. Moreover, Davidson (35), Ban and Lee (36) and Chung and Cheung (37) noted that age directly affected average weekday sleep length, average weekend day sleep length and overall sleep quality.

Conclusions

Poor sleep quality and insomnia are common among secondary school students in Abha City. Female students are more prone to poor sleep quality than male students. Cigarette smoking is associated with poor sleep quality. Insomnia among secondary school students is significantly associated with older age. Therefore, school health programs should apply appropriate anti-smoking control and health education programs in schools. In class, teachers should explain to their students the importance of adopting a healthy lifestyle, including avoidance of smoking and regulating the times for early going to be bed and wake-up. Parents should guide their adolescent children, especially females, toward regulating their sleep and awakening times. Delaying school start times may be proposed as a means of allowing students to get adequate sleep.

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