College Student Participation in Risky Behaviors:

Hazardous Drinking, Sleeping while Driving, and Low Sleep Quality

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Abstract

College students have a high tendency to participate in risky behaviors, such as hazardous drinking and sleeping while driving, which could result from low sleep quality. Therefore, the purpose of the current study is to identify correlations between sleep quality, hazardous drinking, and sleeping while driving among a sample of college students and examine differences by demographic factors (i.e., race/ethnicity and gender). It is aimed to better understand correlations between these risky behaviors for further prevention and development of programs in the future. The study will provide associations between the three specific behaviors, while other studies have focused on one or two of the variables, but not all three. This secondary dataset is survey data collected from 1,228 participants enrolled in a personal health course (HLTH 1000) at East Carolina University in the Spring 2016 semester. The study found that male and White (non Hispanic) individuals had a higher AUDIT-C sumscore than other individuals. The study also found that those who had a higher AUDIT-C sumscore did have lower quality sleep and increased sleeping while driving episodes.

Introduction

College students, especially freshman, encounter stress, social/academic pressures, and loneliness (Beck, Arria, Caldeira, Vincent, O'Grady, & Wish, 2008). Studies show that in order to cope with their new environment, students have a tendency to participate in risky behaviors (e.g., unsafe sex, use of illicit substances), which can lead to a lack of quality sleep. Likewise, sleep might be a low priority if academic pressures are present, such as turning an assignment in on time or an important exam (Lund, Reider, Whiting, & Prichard, 2010). Poor sleep and use of illicit substances could potentially lead to unintentional, accidental death, which is the leading cause of mortality among college students (Turner, Leno, & Keller, 2013). Furthermore, if not properly addressed, detrimental college behaviors could become lifelong adult habits. Universities try to combat these issues with counseling centers, campus wellness programs, and other health services, but if they could target certain sub-populations (e.g., a specific racial group or gender) at increased risk for poor sleep quality, sleeping while driving, and hazardous alcohol consumption, then these target programs may be more effective (Orozco, Lee, & Blando, 2014).

Importance of Sleep

The combination of low quantity and quality of sleep can vastly affect the body. Conditions include, but are not limited to, increased body mass index, increased risk of cardiovascular disease, increased risk of diabetes, and decreased immune function, which can then lead to the development of other diseases as well (Taheri, Lin, Austin, Young, & Mignot, 2004; Division of Sleep Medicine at Harvard Medical School, 2008). The National Sleep Foundation recommends that young adults and adult aged people should

get seven to nine hours of sleep per night to feel their best (Hirshkowitz et al., 2015). However, according to the National Sleep Foundation's 2011 Sleep in America Poll, approximately 6 out of 10 Americans, ages ranging from adolescence to elderly, do not feel like they get enough sleep to "function properly" (Gradisar, Wolfson, Harvey, Hale, Rosenberg, & Czeisler, 2013). Of the 63% who did not get enough sleep, 94% reported that their "mood, school work, family life or home responsibilities, work, social life or leisure activities, and/or intimate/sexual relations," were affected a small amount by their lack of sleep, while 51% said the functions were majorly affected by low sleep quality (Gradisar et al., 2013).

The poll above concerns the general adult population; however, among the young adult age group (19-29 years old), 67% feel they do not get enough sleep to reach their full potential (Gradisar et al., 2013). Sleep issues among 19-29 year olds warrant further study because this age group reports disproportionately higher rates of poor quality sleep. Many behaviors affect the sleep quality of college students: irregular schedules, caffeine late in the day, or using technology before bed (Hershner & Chervin, 2014). Due to these, and other factors, 60% of a sample of college students was categorized as low-quality sleepers (Lund, Reider, Whiting, & Prichard, 2010). Failing to get the amount of quality sleep your body needs has been found to be correlated with lower cognitive functioning, higher stress levels, increased drug and alcohol consumption, more drowsy driving, etc. (Lund, Reider, Whiting, & Prichard, 2010; Howell, Jahrig, & Powell, 2004; Taylor & Bramoweth, 2010). With only 29.4% of college students reporting getting a full eight hours of sleep (Lund, Reider, Whiting, & Prichard, 2010), the negative consequences of inadequate sleep could be more prevalent among this age group. Researchers have

suggested that improving sleep quality for college students could improve cognitive ability, reduce smoking and alcohol consumption, and improve overall well being (Plicher & Walters, 2010; Vail-Smith, Felts, & Becker, 2009).

Sleeping While Driving among College Students

College students often make long trips to and from their home, to internships, or taking trips with their friends. Road trips where college students drink coffee and energy drinks to avoid an extra hotel cost may be fun at the time, but they can also lead to drowsy driving. One study found that drowsy driving could have the same effect, or be more hazardous, than drinking alcohol and driving (Powell, Schechtman, Riley, Li, Troell, & Guilleminault, 2001). Groeger (2006) found that "social and lifestyle changes may reduce sleep opportunities," which undoubtedly applies to college students. The same study also noted that 55% of all sleep-related crashes had drivers who were less than 25 years of age (Groeger, 2006). Approximately 33% of the 18-24 year olds in the U.S. are college students. There were 4,114 traffic related deaths that involved alcohol, and 1,357 of those deaths were college students (Hingson, Heeren, Winter, & Wechsler, 2005). According to the National Sleep Foundation, there is a lack of awareness of the effects of drowsy driving and that drowsy driving is a "prevalent and serious public health issue" (National Sleep Foundation, 2017).

Understanding Alcohol Consumption among College Students

Alcohol consumption has been related to accidental injury, unprotected sex, and increased sexual assault and violence, which does not include the long-term effects such as increased risk for cardiovascular disease, cancer, and cirrhosis of the liver (Ham & Hope, 2003; National Institution Alcohol Abuse and Alcoholism [NIAAA], 2015;

Centers for Disease Control and Prevention, 2016). Roughly 1 in 2 Americans over 18 years old reported drinking in the last month according to the National Survey on Drug use and Health (Substance Abuse and Mental Health Services Administration, 2014). Among people aged 18-22, 58% of those who are in college reported drinking in the last month, compared to 48.1% of their non-college counterparts (NIAAA, 2015). One model speculates a domino effect when college students drink alcohol, based on correlations that have been well researched: increasing alcohol consumption disrupts sleeping patterns, which in turn decreases daytime alertness, and lowers academic performance (Singleton & Wolfson, 2008). It is difficult to determine whether a college student will phase out of drinking alcohol or continue drinking as an adult (Schulenberg & Maggs, 2002).

The National Survey on Drug Use and Health analyzed demographic sub-populations of binge drinkers. Binge drinking is defined by the National Institute on Alcohol and Alcoholism (2017) as a "pattern of drinking that brings blood alcohol content (BAC) to above 0.08% g/dL. This typically occurs after 4 drinks for women and 5 drinks for men—in about 2 hours." The survey found that 29.1% of 18 to 20 year olds reported binge drinking. Also, 44.1% of males and 31.4% of females aged 18-25 reported binge drinking. Twenty to twenty-five percent of all races (Blacks, American Indians or Alaska natives, Whites, Hispanics, and Native Hawaiians or other pacific islanders) reported binge drinking (Substance Abuse and Mental Health Services Administration, 2014). Binge drinking can lead to increased hazardous behaviors, "including car crashes, drunk-driving arrests, sexual assaults, and injuries. Over the long term, frequent binge drinking can damage the liver and other organs" (NIAAA, 2015). Furthermore, 1,825

college students aged 18-24 years old died from alcohol related unintentional injury (including traffic and non-traffic accidents) in 2005, and according to the study based on past rates, death rates are only increasing for this type of death within the age group (Hingson, Heeren, Winter, & Wechsler, 2005).

Purpose of current study

The purpose of the current study is to identify correlations between sleep quality, hazardous drinking, and sleeping while driving among a sample of college students and examine differences by demographic factors (i.e., race/ethnicity and gender). It is aimed to detect risky behaviors for further prevention and development of programs in the future. The study will provide associations between the three specific behaviors, while other studies have focused on one or two of the variables, but not all three. Analyzing sleeping while driving, sleep quality, and hazardous drinking via a comprehensive study could produce connections between the variables, which would provide implications for targeting populations when developing health surveys and programs in the future.

Research Questions

Are there associations between low quality sleep, hazardous drinking, and sleeping while driving among a sample of college students?

Are there differences between low sleep quality, hazardous drinking, and sleeping while driving by gender among a sample of college students?

Are there differences between low sleep quality, hazardous drinking, and sleeping while driving by race among a sample of college students?

Hypotheses

I hypothesize that students who participate in hazardous drinking will have a higher risk of low sleep quality and sleeping while driving. Based on current literature, I hypothesize that males will be more likely to hazardously drink, sleep while drive, and have low sleep quality than females. I believe that White students will be more likely to hazardously drink, sleep while driving, and have low sleep quality than other races.

Methodology

This secondary dataset is survey data collected from HLTH 1000 students at East Carolina University in the Spring 2016 semester. The data was collected between April 11, 2016 and May 15, 2016. HLTH 1000 participants completed the HLTH 1000 Survey via Qualtrics. The data was analyzed using SPSS software.

Participants

The population includes 1,298 students enrolled in a mandatory personal health course (HLTH 1000) at East Carolina University who completed a voluntary online health survey in Spring 2016. An extra credit incentive in the class was offered to the students per completion of the survey.

Measures

The HLTH 1000 survey included questions assessing hazardous drinking, sleeping while driving, and sleep quality.

Hazardous drinking was assessed via the AUDIT-C, which includes three questions assessing how often an individual had an alcoholic drink, how many drinks he/she has on a typical day, and how often he/she had six or more drinks on one occasion (Bush et al., 1998; Bradley et al., 2007). The questions and answers are as follows:

1. How often do you have a drink containing alcohol?

Never
Monthly or less
2-4 times per month
2-3 times a week
4 or more times a week

2. How many standard drinks containing alcohol do you have on a typical day?

None
1 or 2
3 or 4
5 or 6
7 to 9
10 or more

3. How often do you have six or more drinks on one occasion?

Never
Less than monthly
Monthly
Weekly
Daily or almost daily

Sleep quality was assessed using a question from the Pittsburg Sleep Quality Index (PSQI). The question uses a Likert scale to compare the "very good" sleepers from the "fairly good," fairly bad," and "very bad" sleepers (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The question and answers are as follows:

1. During the past month, how would you rate your sleep quality?

Very good
Fairly good
Fairly bad
Very bad

Sleeping while driving was assessed via a question used in a study by Wheaton, Shults, Chapman, Ford, and Croft (2014). The question and answers are as follows:

1. In the past 30 days, how often have you nodded off or fallen asleep, even just for a brief moment, while driving?

Never

Just Once
Rarely
Fairly Often
Regularly

Demographics assessed were race (White (non Hispanic), Black (non Hispanic), Hispanic or Latino, Asian or Pacific Islander, American Indian or Alaskan Native, and other), age, gender (male, female, and neither), and class standing (Freshman, Sophomore, Junior, and Senior).

Data analysis and Results

Hazardous Drinking

The AUDIT-C was used to formulate the hazardous drinking score for each response (Bush et al., 1998; Bradley et al., 2007). Each question was scaled zero to four based on the answer choices and then entered into SPSS software. The three questions were summed to calculate the overall drinking score, or the Audit sum score. The AUDIT-C sumscore had a range of zero to twelve. The mean, median, and standard deviation of the AUDIT-C sumscores are displayed in table 1.

Each question's answers were scaled zero to four as follows:

1. How often do you have a drink containing alcohol?

    0. Never
    1. Monthly or less
    2. 2-4 times per month
    3. 2-3 times a week
    4. 4 or more times a week

2. How many standard drinks containing alcohol do you have on a typical day?

    0. 0 to 2
    1. 3 or 4
    2. 5 or 6
    3. 7 to 9

4. 10 or more

3. How often do you have six or more drinks on one occasion?
    0. Never
    1. Less than monthly
    2. Monthly
    3. Weekly
    4. Daily or almost daily

Table 1. AUDIT-C sumscore Statistics.

Variable	Mean	Median	Range	Standard Deviation
Audit Sum Score	3.29	3.00	0-12	2.701

Sleeping While Driving

Sleeping while driving was assessed using the question "In the past 30 days, how often have you nodded off of fallen asleep, even just for a brief moment, while driving?" The answer choices were "not during the past month," "less than once a week," "once or twice a week," or "three or more times a week." These answers were analyzed based on two groups: A "no" group that answered, "not during the past month," and a "yes" group that answered, "less than once a week," "once or twice a week," or "three or more times a week." The frequency and percentages are recorded in table 2.

Table 2. Sleeping while Driving Statistics.

Response	Frequency	Percent
No	1044	80.4
Yes	254	19.6

Sleep Quality

Sleep quality was assessed via a question from the PSQI (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The answer choices for this question were "very good," "fairly good," fairly bad," and "very bad." The answers were grouped for analysis by

separating “very good” in a category and “fairly good,” fairly bad,” and “very bad” into a category. The statistics are displayed in table 3.

Table 3. Sleep Quality Statistics.

Response	Frequency	Percent
Very good	154	11.9
Less than very good	1144	88.1

Age

The question “How old are you?” had response options of 18, 19, 20, 21, 22, 23, 24, or 25 or over. The frequencies and percentages of each age are recorded in table 4.

Table 4. Age Statistics.

Age	Frequency	Percent
18	465	35.8
19	569	43.8
20	119	9.2
21	72	5.5
22	29	2.2
23	14	1.1
24	7	.5
25 or over	23	1.8

Race

Race was assessed with the question “How do you describe yourself?” and the following White (non Hispanic), Black (non Hispanic), Hispanic or Latino, Asian or Pacific Islander, American Indian or Alaskan Native, and other. The frequency and percent of answers is displayed in table 5 below.

Table 5. Race Statistics.

Category	Frequency	Percent
White (non Hispanic)	967	74.5%
Black (non Hispanic)	180	13.9%
Hispanic or Latino	58	4.5%
Asian or Pacific Islander	44	3.4%
American Indian or Alaskan	9	0.7%

Native		
Other	40	3.1%

Gender

The question "How do you consider yourself?" assessed gender. Male, female, or neither were options. The frequencies and percentages of each group are recorded in table 6.

Table 6. Gender Statistics.

Gender	Frequency	Percent
Male	475	36.6
Female	823	63.4

Class Standing

The question "What is your class standing?" had answer choices of "freshman," "sophomore," "junior," "senior," and "other." The frequencies and percentages are recorded in table 7.

Table 7. Class Standing Statistics.

Class Standing	Frequency	Percent
Freshman	966	74.4
Sophomore	198	15.3
Junior	101	7.8
Senior	26	2.0
Other	6	0.5

Tests of Association

One-way ANOVA tests were used for assessing relationships between categorical variables of interest and continuous variables of interest. These analyses were used to examine (1) AUDIT-C sumscore by sleeping while driving; (2) AUDIT-C sumscore by sleep quality; (3) AUDIT-C sumscore by sex; and (4) AUDIT-C sumscore by race. See table 8 for the f-statistic and the statistical significance of each one-way ANOVA analysis.

Table 8. One-way ANOVA tests examining associations between AUDIT-C sumscores and sleeping while driving, sleep quality, sex and race

Variables tested	F-Statistic	P-Value	N	Mean (SD)
AUDIT-C sumscore by Sleeping while driving	5.754	.017		
No			1044	3.2 (2.7)
Yes			254	3.7 (2.8)
AUDIT-C sumscore by Sleep Quality	4.910	.027		
Very good			154	2.84
Less than very good			1144	3.35
AUDIT-C sumscore by Sex	82.12	P< .001		
Male			475	4.16
Female			823	2.79
AUDIT-C sumscore by Race	10.940	P< .001		
White (non Hispanic)			967	3.59
Black (non Hispanic)			180	2.08
Hispanic or Latino			58	2.67
Asian or Pacific Islander			44	2.93
American Indian or Alaskan Native			9	2.56
Other			40	2.98

Chi-square tests with cross tabulations were for assessing relationships between categorical variables. A Chi square test was used to examine sleeping while driving by sleep quality; sleeping while driving by race; sleeping while driving by sex; sleep quality by race; and sleep quality by sex. Table 9 displays the variables tested, chi-square statistic, and the statistical significance.

Table 9. Chi Square Test statistics.

Variables Tested	Chi-square statistic	P-Value	Fell Asleep While Driving	Did not Sleep while Driving
Sleeping while driving by sleep quality	.035	.852		
Very Good			31 (20.1%)	123 (79.9%)
Less than very good			223 (19.5%)	921 (80.5%)
Sleeping while driving by race	3.497	.624		
White (non Hispanic)			782 (80.9%)	185 (19.1%)
Black (non Hispanic)			143 (79.4%)	37 (20.6%)

Hispanic or Latino			45 (77.6%)	13 (22.4%)
Asian or Pacific Islander			32 (72.7%)	12 (27.3%)
American Indian or Alaskan Native			7 (77.8%)	2 (22.2%)
Other			35 (87.5%)	5 (12.5%)
Sleeping while driving by sex	3.063	.080		
Male			105 (22.1%)	370 (77.9%)
Female			149 (18.1%)	674 (81.9%)
			Very Good	**Less than Very Good**
Sleep quality by race	3.832	.574		
White (non Hispanic)			122 (12.6%)	845 (87.4%)
Black (non Hispanic)			17 (9.4%)	163 (90.6%)
Hispanic or Latino			7 (12.1%)	51 (87.9%)
Asian or Pacific Islander			3 (6.8%)	41 (93.2%)
American Indian or Alaskan Native			0 (0.0%)	9 (100.0%)
Other			5 (12.5%)	35 (87.5%)
Sleep quality by sex	2.373	.123		
Male			65 (13.7%)	410 (86.3%)
Female			89 (10.8%)	734 (89.2%)

Sleeping While Driving

The relationship between sleeping while driving and sleep quality was assessed. Of those who reported not falling asleep while driving, 123 (79.9%) said their sleep quality was very good, while 921 (80.5%) said they had less than very good sleep quality. The group who fell asleep had 31 (20.1%) that had very good sleep quality and 223 (19.5%) that had less than very good sleep quality. The Chi square value and significance are reported in Table 9.

The relationship between sleeping while driving and sex was assessed. There are 370 (77.9%) males who did not sleep and drive, and 674 (81.9%) females who did not sleep and drive. There are 105 (22.1%) males who did sleep and drive, and 149 (18.1%)

females who did sleep and drive. The Chi square value and statistical significance is in table 9.

The relationship between sleeping while driving and race was assessed. There are 782 (80.9%) White (non Hispanic) individuals who fell asleep while driving and 185 (19.1%) who did not fall asleep while driving. There are 143 (79.4%) Black (non Hispanic) individuals who fell asleep while driving and 37 (20.6%) who did not fall asleep while driving. There are 45 (77.6%) Hispanic or Latino individuals who fell asleep while driving and 13 (22.4%) who did not fall asleep while driving. There are 32 (72.7%) Asian or Pacific Islander individuals who fell asleep while driving and 12 (27.3%) who did not fall asleep while driving. There are 7 (77.8%) American Indian or Alaskan Native individuals who fell asleep while driving and 2 (22.2%) who did not fall asleep while driving. There are 35 (87.5%) individuals classified as other who fell asleep while driving and 5 (12.5%) who did not fall asleep while driving. The Chi square value and statistical significance is in table 9.

Sleep Quality

The relationship between sleep quality and sex was assessed. There are 65 (13.7%) males who had very good sleep quality, and 89 (10.8%) females who had very good sleep quality. There are 410 (86.3%) males who had less than very good sleep quality, and 734 (89.2%) females who had less than very good sleep quality. The Chi square value and statistical significance is in table 9.

The relationship between sleeping quality and race was assessed. There are 122 (12.6%) White (non Hispanic) individuals who had very good sleep quality and 845 (87.4%) who had poor sleep quality. There are 17 (9.4%) Black (non Hispanic)

individuals who had very good sleep quality and 163 (90.6%) who had poor sleep quality. There are 7 (12.1%) Hispanic or Latino individuals who had very good sleep quality and 51 (87.9%) who had poor sleep quality. There are 3 (6.8%) Asian or Pacific Islander individuals who had very good sleep quality and 41 (93.2%) who had poor sleep quality. There are 0 (0.0%) American Indian or Alaskan Native individuals who had very good sleep quality and 9 (100.0%) who had poor sleep quality. There are 5 (12.5%) individuals classified as other who had very good sleep quality and 35 (87.5%) who had poor sleep quality.

Hazardous Drinking

The relationship between hazardous drinking and sleep quality was assessed. Of those who reported drinking, 154 said their sleep quality was very good, while 1144 said they had less than very good sleep quality. The mean AUDIT-C sumscore of those who has very good sleep quality is 2.84, and the mean AUDIT-C of those who had less than very good sleep quality is 3.35. The F statistic and significance are reported in Table 8.

The relationship between hazardous drinking and sleeping while driving was assessed. Of those who reported drinking, 254 participants did sleep while driving and 1044 did sleep while driving. The mean AUDIT-C sumscore of those who slept while driving is 3.7, while the mean of those who did not sleep while driving is 3.2. The F statistic and significance are reported in Table 8.

The relationship between hazardous drinking and race was assessed. There are 967 White (non Hispanic) individuals who reported drinking, with a mean AUDIT-C sumscore of 3.59. There are 180 Black (non Hispanic) individuals who reported drinking, with a mean AUDIT-C sumscore of 2.80. There are 58 Hispanic or Latino individuals

who reported drinking, with a mean AUDIT-C sumscore of 2.67. There are 44 Asian or Pacific Islander individuals who reported drinking, with a mean AUDIT-C sumscore of 2.93. There are 9 American Indian or Alaskan Native individuals who reported drinking, with a mean AUDIT-C sumscore of 2.56. There are 40 individuals classified as other who reported drinking, with a mean AUDIT-C sumscore of 2.98. The F statistic and significance are reported in Table 8.

The relationship between hazardous drinking and sex was assessed. There are 475 males who reported drinking, and 823 females who reported drinking. The mean AUDIT-C sumscore for males is 4.16, and the mean for females is 2.79. The F statistic and significance are reported in Table 8.

Discussion

The one-way ANOVA test for the AUDIT-C sumscore by sleeping while driving was found to be statistically significant (P-value = 0.017). The hypothesis that a higher AUDIT-C sumscore, a more hazardous drinker, would yield higher rates of sleeping while driving was founded. The one-way ANOVA test for the AUDIT-C sumscore by sleep quality was found to be statistically significant (P-value = 0.027). The hypothesis that a higher AUDIT-C sumscore, a more hazardous drinker, had worse sleep quality is accepted. Therefore, based on the results, those who are more hazardous drinkers have lower sleep quality. Two separate studies found that the percentages are almost the same for students who consume alcohol and have low sleep quality, 58% and 60%, respectively (NIAAA, 2015; Lund, Reider, Whiting, & Prichard, 2010). Further qualitative studies could be conducted to determine if drinking causes low quality sleep, or vice versa. One study by Singleton & Wolfson (2008) speculated a domino effect that

begins with increased alcohol causing low sleep quality. However, if low quality sleep effects cognitive functions, the decision to not consume alcohol may be unclear to students. The current study warrants further implications for programs that target drinking and sleep as co-habits due to the associations between sleep quality and hazardous drinking.

The association between sleeping while driving and sleep quality was not found to be significant. This did not support the hypothesis that low sleep quality is associated with increased sleeping while driving, despite other studies that found the two variables to be related (Lund, Reider, Whiting, & Prichard, 2010; Howell, Jahrig, & Powell, 2004; Taylor & Bramoweth, 2010). Therefore, further studies should be conducted to determine the relatedness of low quality sleep and sleeping while driving.

Males had a higher AUDIT-C sumscore mean (4.16) than females (2.79), which was found to be statistically significant (P value = < 0.001). However, sleeping while driving and sleep quality by sex were not statistically significant findings. Therefore, the hypothesis was supported for hazardous drinking, but not for sleeping while driving and sleep quality. The current study's findings align with the National Survey on Drug Use and Health that found males are more likely to drink than females (Substance Abuse and Mental Health Services Administration, 2014). Therefore, colleges should investigate programs that target males to combat hazardous drinking in this population.

AUDIT-C sumscore by race was significant (P value = < 0.001), with White (non Hispanic) individuals having the highest mean score of 3.59. However, sleeping while driving and sleep quality by race were not statistically significant. Based on other literature, all races tend to have around 25% of individuals who drink; while the current

study found that more White (non Hispanic) individuals tend to drink (Substance Abuse and Mental Health Services Administration, 2014). Therefore, further research may be conducted to find an affirmative race that tends to consume more alcohol.

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