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Millennials' Sleep and Unethical Behavior: Testing the Relationship between Sleep and Academic Dishonesty of Millennials in a Korean University

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Abstract: This study empirically examined the impact of sleep quantity and sleep quality on academic dishonesty as a kind of unethical behavior with a sample of 237 millennials in a Korean university. Sleep quantity was calculated by subtracting bedtime, sleep latency, and wake after sleep onset (WASO) from wake-up time. Sleep quality was measured with the Insomnia Scale developed by Jenkins et al. (1988), and all items are reverse coded. Plagiarism and attitudes toward academic dishonesty (ATAD) were selected as unethical behaviors of millennials at the university. The results of this study are as follows: (1) sleep quantity and sleep quality have negative relationships with ego depletion; (2) ego depletion has no significant relationship with plagiarism or ATAD; (3) sleep quantity has no relationship with plagiarism or ATAD; (4) sleep quality has negative relationships with plagiarism and ATAD; (5) all four indirect effects of sleep quantity and sleep quality on plagiarism and ATAD through ego depletion are not significant. Based on the results, theoretical and practical implications are discussed, and the limitations of this study and recommendations for future research are provided.

1. Introduction

Millennials are becoming mainstream workers and leaders of business throughout the world. They are usually considered to be individuals born between 1980 and 2000. There are approximately 80 million people in this group, which is more populous than baby boomers (born between 1946 and 1964) by four million in the United States [1]. It is estimated that India alone will have roughly 464 million millennial employees by the end of 2020 [2]. Millennials constitute roughly 13 million people in Korea, a fourth of the Korean population [3]. They have been understood as "the most educated and technology-savvy population in the history of humankind" [1,4]. Most of them grew up in a technology-rich and multicultural environment, and were born to financially stable parents [2]. They are familiar with instant communication, media, and digital technology. They are almost always connected with others and society through a social-network service (SNS), YouTube, blogs, cellphones, and so on. This tendency gave them the name, Generation N (network) [5]. They have more global experiences and global perspectives through the advantage of social media and rich parents. They have grown up in the era of globalization and have more opportunities to study abroad and gain exposure to diverse cultures [1,6].

Millennials are referred to as Generation Me, as they are perceived as being self-absorbed or narcissistic. Although 75% of them have created a profile of themselves on a social network site, they have little direct interpersonal connections and do not show much interest in others, including

through empathy, charity donations, and having a job that primarily provides for society. They pursue personal gratification or egotism more strongly than other generations did at their age. They have been described as generally materialistic, as they emphasize extrinsic values such as money, image, and fame, rather than intrinsic values that lean toward affiliation and community [1]. Sometimes they have been described as being more environmentally conscious, more attentive to corporate social responsibility (CSR) issues, and concerned and inclined towards charitable actions than past generations (see Nielsen [7] and Formánková et al. [8]). They have a great desire for wellbeing, work–life balance, and individual welfare [8,9]. Technology-savvy millennials are also criticized as having short attention spans. This tendency may lead them to crave immediate feedback on their performance and contributions, and to seek instant success in every endeavor. Therefore, they generally lack loyalty to their employers. It may also decrease their fundamental literacy skills [1,2].

Unethical behavior may be a general issue for millennials, because they are narcissistic and materialistic and have short attention spans. The relevant literature has typically focused on willpower and desire as antecedents of unethical behavior. People can refrain from unethical behavior if their willpower is stronger than their desire [10]. It is supposed that millennials have stronger desire than other generations, because they are narcissistic and materialistic [11], and have less willpower due to their short attention span [1].

Millennials' connectedness with others through IT may generate issues with sleeping. More than 80% of them sleep with a cell phone at their bedside in order to respond to texts, emails, or tweets immediately [12]. Exposure to blue light of electronic devices disrupts the sleep-inducing process related to melatonin. Some studies empirically found that the usage of cell phones late at night negatively influenced sleep quantity and quality [13].

However, few studies dealt with the relationship between sleep and unethical behavior of millennials. Among some exceptions, the studies examined the relationship based on the sample from general population. They adopted various unethical behaviors as dependent variables. Barnes et al. [14] adopted unethical behavior at work. Christen and Ellis [15] adopted workplace deviance, theft, and interpersonal deviance. Welsh et al. [16,17] adopted deceptive behavior, and unethical decision making.

This study explores the impact of sleep on academic dishonesty of millennials in a Korean university. Academic dishonesty is a persistent and pervasive unethical behavior on college campuses in the world, including in the United States and the Republic of Korea [18–20]. Kuron et al. [21] empirically show that millennials' work values, which play a pivotal role in shaping their decisions and subsequent behavior, do not differ greatly across the school-to-work transition.

2. Theoretical Background and Hypotheses

These concepts of sustainability, unethical behavior, and millennials are highly interconnected. Ethical factors, including unethical behavior, are an important dimension of sustainability [18]. Millennials are assumed to be more aware of social responsibility than other generations [7,8]. However, they are also narcissistic and materialistic [1,8,9].

Barnes et al. [14] empirically showed the mediation effect of ego depletion on the relationship between sleep and unethical behavior based on the Ego Depletion Model developed by Baumeister et al. [22]. Ego depletion refers to "a temporary reduction in one's capacity or willingness to engage in volitional action, which includes controlling the environment or controlling oneself, making choices, and initiating action [14,22]." A sleep problem is positively related to ego depletion. Furthermore, ego depletion is linked with unethical behavior. Integrating these, a sleep problem is related to unethical behavior. Other studies also empirically tackled the same model or variant models [15–17].

This study offers a mediation model of ego depletion on the relationship between sleep problems and academic dishonesty of millennials on a college campus. Sleep problems include lack of sleep quantity and poor sleep quality. Sleep quantity refers to "the amount of time an individual spends

in a sleeping state", and poor sleep quality refers to "difficulty falling asleep, staying asleep, and the number of awakenings experienced throughout the night" [13,14].

In this study, academic dishonesty includes plagiarism and attitude toward academic dishonesty (ATAD). Academic dishonesty is an umbrella term meaning "behavior that results in students giving or receiving unauthorized assistance in an academic exercise or receiving credit for work which is not their own" [23]. Ellahi et al. [19] suggested nine types of academic dishonesty, revising Akbulut et al. [24]: fabrication, falsification, finagling, plagiarism, duplication, least publishable units, neglecting support, misusing credit, and double submission. Among various kinds of academic dishonesty, plagiarism is more common among millennials because their integration of IT into their lives easily provides temptation for copying others' thoughts and writing, and they also lack basic literary fundamentals and have short attention spans [1]. Random House Webster's Unabridged Dictionary (2006) defines plagiarism as "the unauthorized use or close imitation of the language and thoughts of another author and the representation of them as one's own original work". This study also chooses ATAD as a dependent variable, because Bolin [20] argues that ATAD is a good predictor of actual academic dishonesty.

Education about academic dishonesty has been given to college students in Korea extensively. They are required to test the degree of plagiarism before submitting their reports using a relevant software, such as Copykiller ©. Many learning management systems of Korean universities have included that kind of testing functions. Sometimes governmental agencies or lawyers, who are appointed by intellectual property owners, have investigated the violation of intellectual property law of college students and professors.

Previous studies on the topic of academic dishonesty have examined relatively static individual differences as antecedents of academic dishonesty. For instance, Cuadrado et al. [18] empirically examined the relationships between academic dishonesty and individual differences, such as conscientiousness, agreeableness, general mental ability, sex, age, emotional stability, extraversion, and openness to experience. However, there is increasing interest in antecedent conditions that may vary over time. They can be called dynamic employee characteristics, and they include sleep [14].

People should engage in self-regulation in order to abstain from immediate contentment and overcome instant compulsion through the workday. Self-control activities draw from a common resource under the Ego Depletion Model [22]. Executive control over thoughts, emotions, and behaviors is also allowed by this resource. A person could be depleted over time as one engages in self-regulation, because one's self-regulatory resource is limited. The depletion involves a temporary reduction in one's capacity to engage in volitional action. A sleep-deprived person could also experience a temporary reduction in their capacity for self-control [15–17].

Baumeister et al. [25] speculated that sleep is needed to replenish the self-regulatory resource postulated in their Ego Depletion Model. One's sleep deprivation makes one's brain functioning decrease, particularly in the prefrontal cortex [26]. Neuroscience suggests that sleep deprivation impairs the region through reductions in glucose metabolism [27]. As a fuel for the brain, glucose plays an important role in self-regulation [28]. Therefore, sleep deprivation induces ego depletion, which is the depletion of self-regulatory resource. Previous studies empirically showed the relationship between sleep deprivation and ego depletion [14–17].

Sleep deprivation is a negative function of both sleep quantity and sleep quality, which show "parallel and additive effects on self-regulation" [17,29,30]. This study hypothesizes that both sleep quantity and sleep quality will be negatively related to ego depletion.

Hypothesis 1. *(a) Sleep quantity and (b) sleep quality will be negatively related to ego depletion.*

There is a potential benefit of unethical behavior, which is one of the primary reasons people behave unethically [31]. People take benefits and costs into account when considering alternative behavior with unethical implications. They need self-regulation to overcome the temptation to engage

in unethical behavior. Without self-regulation, they will behave unethically. In other words, people who have been depleted the self-regulation resource are more likely to behave unethically [14].

Prior studies empirically showed the relationship between ego depletion and unethical behavior through experimental studies and field studies. Mead et al. [32] showed that more-depleted participants over-reported the number of puzzles they solved and would be paid for than less-depleted participants did. Welsh et al. [16] showed that more-depleted participants were more likely to send a deceptive message to their game partners than less-depleted participants were. Barnes et al. [14] showed a positive relationship between ego depletion and supervisor-rated unethical behavior at work in Study 3, and the positive relationship between ego depletion and self-rated unethical behavior at work in Study 4.

Students could benefit from academic dishonesty, including plagiarism. They could easily get higher grades than their schoolmates through academic dishonesty. Academic dishonesty is easy, because the integration of IT into their lives provides the temptation for copying others' thoughts and writing [1]. They need self-regulation to overcome the temptation to engage in academic dishonesty. Without self-regulation, they will be academically dishonest. In other words, people who have been depleted the self-regulation resource are more likely to do the academic dishonesty. This study hypothesizes that ego depletion will be positively related to academic dishonesty.

Hypothesis 2. *Ego depletion will be positively related to academic dishonesty.*

Integrating Hypotheses 1 and 2, we predict that sleep quantity and sleep quality will be negatively related to academic dishonesty, and that ego depletion will mediate these relationships. Many studies showed that sleep was negatively related to unethical behavior [14–17], and that ego depletion mediated the relationship between sleep and unethical behavior [14,16,17]. This study makes the following Hypotheses:

Hypothesis 3. *(a) Sleep quantity and (b) sleep quality will be negatively related to academic dishonesty.*

Hypothesis 4. *Ego depletion will mediate (a) the relationship between sleep quantity and academic dishonesty, and (b) the relationship between sleep quality and academic dishonesty.*

3. Method

This study collected data from 237 millennials enrolled in management courses, such as Human Resource Management, New Venture Creation, Organizational Behavior, and Strategic Management at a Korean university through a mobile application (i.e., Socrative Student ©) during 2 semesters. Each semester had first and second survey from the same students in order to avoid the common method bias issue [33]. The overlap between the students in the first semester and in the second semester is only three students.

The survey in the first semester gathered data from 105 millennials on 27 November 2017 and 20 December 2017. On 27 November 2017, which was 4 weeks after the end of their mid-term exams, 106 students participated in the first survey. On 20 December 2017, which was almost 4 weeks after completing the first survey, the same 105 students participated in the second survey, as a student dropped out of the semester. One day after finishing the second survey, they took their final exams.

The survey in the second semester gathered data from 132 millennials on 21 May 2018 and 19 June 2018. On 21 May 2018, which was 4 weeks after the end of their mid-term exams, 132 students participated in the first survey. On 19 June 2018, which was almost 4 weeks after completing the first survey, the same 132 students participated in the second survey. One day after finishing the second survey, they took their final exams.

Table 1 shows characteristics of the 237 undergraduate students (i.e., millennials) sampled. A total of 33% (78 students) of the sample are from Human Resource Management classes, which are divided

into an afternoon class and an evening class. A total of 11% (27 students) of the sample are from an afternoon class of New Venture Creation. These are from the first semester survey. A total of 29% of the sample (68 students) are from Organizational Behavior classes, which are divided into a morning class and an evening class. A total of 27% of the sample (64 students) are from Strategic Management classes, which are divided into an afternoon class and an evening class. The sample consists of 154 males and 83 females (35%). The birth year of the respondents are mostly between 1991 and 1995 (153 students, 65%). A total of 33% (78 students) were born in or after 1996, and only 6 students (3%) were born in 1990 or before. Their credit hours per week are mostly between 16 and 18 h (129 students, 54%). A total of 19% (45 students) have 15 h or less of credit, and the remaining 27% (63 students) have 19 h or more of credit. Most of them (129 students, 54%) have part-time jobs. A total of 10% of the sample (23 students) works 21 h or more per week. Only a third of them (81 students, 34%) participate in non-course activities. A total of 89% of them demand 40 h or less for their study, part time job, and non-course activities. As many as 83 students (35%) do not exercise at all. Only 81 students (34%) do not take a nap. Surprisingly, as many as 85 students (36%) take a nap for more than 31 min per day. More surprisingly, 67 students (28%) go to bed after 2 a.m. Only 38 students (16%) go to bed before midnight.

Table 1. Characteristics of millennials sampled.

Classification		Cases	Ratio	Classification		Cases	Ratio
Gender	Male	154	65%	Class	HRM–Afternoon	48	20%
	Female	83	35%		HRM–Evening	30	13%
Birth year	1989–1990	6	3%		NVC–Afternoon	27	11%
	1991–1995	153	65%		OB–Morning	34	14%
	1996–2000	78	33%		OB–Evening	34	14%
Time demand (h/week)	6–10	3	1%		SM–Afternoon	37	16%
	11–20	72	30%		SM–Evening	27	11%
	21–30	73	31%	Bedtime (when to go to bed)	22:00–0:00	38	16%
	31–40	61	26%		0:01–1:00	75	32%
	41–62	28	12%		1:01–2:00	57	24%
Exercise (h/week)	0	83	35%		2:01–3:00	48	20%
	1–5	123	52%		3:01–6:00	19	8%
	6–10	29	12%	Total		237	100%
	11–15	2	1%				

Note: HRM (human resource management), NVC (new venture creation), OB (organizational behavior), SM (strategic management).

This study had two data points in order to avoid the common method variance issue, which many prior studies have related [33]. Plagiarism, attitude toward academic dishonesty, ego depletion, and time demand were assessed using the questionnaire of the second survey of each semester. Sleep quantity and sleep quality were assessed using the questionnaire of the first survey of each semester.

Plagiarism was measured with the scale developed by Ellahi et al. [19], which consists of four items. All answers were provided on a 5-point Likert scale. The internal consistency of the scale was good, as the Cronbach's α exceeded 0.7 (0.84; see Table 3). The ATAD was measured with the ATAD Scale developed by Davis et al. [34], which contains four items that deal with participants' moral evaluations of cheating. The internal consistency of the scale was marginally acceptable, because the Cronbach's α was around 0.7 (0.67; see Table 3) after excluding two items. Ego depletion was measured using four items (e.g., "My mental energy is running low.") from the State Self-Control Capacity Scale [15,35], which refers to the experience of self-regulatory resource depletion as proposed by Muraven and Baumeister [36]. All answers were provided on a 5-point Likert scale. The internal consistency of the scale was good because the Cronbach's α exceeded 0.7 (0.83; see Table 3).

Sleep quantity was measured using the Pittsburgh Sleep Diary (PSD) [37]. The time span is during the 4 weeks before each first survey, as per the Pittsburgh Sleep Quality Index (PSQI) [38]. The PSD measure asks participants to report the time at which they went to bed the previous night (bedtime), how long it took them to fall asleep (sleep latency), how many minutes they spent awake throughout the night after initially falling asleep (WASO), and at what time they awoke in the morning (wake-up time) [37]. Bedtime, sleep latency, and WASO were subtracted from wake-up time in order to calculate the sleep quantity. The calculated minute is a self-report measure of the number of minutes participants spent sleeping that night. In this study, sleep quantity assesses the average time spent sleeping during the 4 weeks. The first survey questionnaire asks for averages of bedtime, sleep latency, WASO, and wake-up time during the 4 weeks, as the PSQI does.

Sleep quality is measured with the Insomnia Scale developed by Jenkins et al. [39] during the four weeks before the first survey. Sample items include "Had trouble falling asleep" and "Woke up after your usual amount of sleep feeling tired and worn out." All answers were provided on a 6-point Likert scale. The internal consistency of the scale was acceptable because the Cronbach's α was around 0.7 (0.67; see Table 3). The items are reverse coded to index sleep quality instead of insomnia.

Table 2 shows the results of factor analysis of four variables excluding sleep quantity. A principal component of 14 items delineates the underlying four variables, which are plagiarism, ego depletion, attitude toward academic dishonesty, and insomnia.

Table 2. Factor analysis of variables.

	Factor Loadings			
	Ego Depletion	**Plagiarism**	**Insomnia**	**ATAD**
Ego depletion 1	**0.83**	0.00	0.15	−0.03
Ego depletion 2	**0.82**	0.04	0.21	0.00
Ego depletion 3	**0.80**	0.09	0.09	0.08
Ego depletion 4	**0.73**	0.11	0.01	0.06
Plagiarism 2	0.05	**0.89**	0.12	0.06
Plagiarism 3	0.04	**0.86**	0.08	0.05
Plagiarism 1	0.00	**0.76**	−0.02	0.00
Plagiarism 4	0.13	**0.75**	0.00	0.10
Insomnia 2	0.01	0.07	**0.85**	−0.05
Insomnia 3	0.16	0.08	**0.75**	−0.02
Insomnia 1	0.17	0.03	**0.59**	0.30
Insomnia 4	0.44	−0.07	**0.47**	0.24
ATAD 3	0.04	0.02	0.16	**0.85**
ATAD 2	0.06	0.17	−0.01	**0.84**
Eigenvalue	3.7	2.5	1.6	1.3
Variance explained	26.6%	17.9%	11.2%	9.4%
Cumulative variance explained	26.6%	44.4%	55.7%	65.1%

Note: ATAD (attitude toward academic dishonesty). Bold number means that the variable is related to the specific factor.

Some are included as control variables, such as gender, time demand, and exercise [14]. Gender is a dummy variable, where 1 means female and 0 means male. Time demand means the required time for each student to finish their study and work. It is calculated as the sum of the credit hours, the hours to do one's non-course activity, and the work hours of one's part-time jobs. The time dedicated to academic activity includes the credit hours and the hours to do one's non-course activity. Exercise is the hours per week during which the respondent devotes to strenuous or moderately strenuous physical activity.

4. Results

Table 3 shows the means, standard deviations, min, max, and correlations among research variables. Plagiarism and ATAD are positively related as two kinds of academic dishonesty. Sleep quantity and sleep quality have a marginal correlation of 0.14, as Barnes et al. [14] reported between-individual correlations of 0.11 in study 3 and 0.07 in study 4. Among sleep and academic dishonesty variables, only sleep quality is significantly related to ATAD. The correlation between sleep quality and ego depletion (i.e., −0.40) is stronger than that between sleep quantity and ego depletion (i.e., −0.15), as Barnes et al. [14] reported between-individual correlations of −0.45 and −0.18 in study 3. Among ego depletion and academic dishonesty variables, only plagiarism is significantly related to ego depletion. Therefore, this study may anticipate the indirect effects of ego depletion on the relationships between sleep quantity and quality, and plagiarism although the correlations between sleep quantity and quality, and plagiarism (i.e., −0.07 and −0.13, respectively) are weak and not significant.

Table 3. Means, standard deviations (S.D.), minimum (Min), maximum (Max), and correlations.

Variable	Mean	S.D.	Min	Max	1	2	3	4	5	6	7
1. Plagiarism	1.95	0.87	1	4.5	(0.84)						
2. ATAD	2.29	1.03	1	5	0.18[**]	(0.67)					
3. Ego depletion	2.81	0.90	1	5	0.15[*]	0.12	(0.83)				
4. Sleep quantity (h per day)	6.7	1.6	2	9.9	−0.07	0.00	−0.15[*]	-			
5. Sleep quality	15	3	4	20	−0.13	−0.23[**]	−0.40[**]	0.14[*]	(0.67)		
6. Gender (d, 1 = female)	0.35	0.48	0	1	0.08	−0.05	0.12	0.05	−0.03	-	
7. Time demand (hours per week)	28	11	6	62	0.08	−0.03	0.02	−0.14[*]	0.02	0.01	-
8. Exercise (h per week)	2.2	2.7	0	15	0.02	−0.09	−0.10	−0.15[*]	0.07	−0.16[*]	0.08

Note: N = 237; d in parenthesis means a dummy variable; Cronbach's α in parenthesis on diagonals; [*] correlation significant ($p < 0.05$); [**] correlation significant ($p < 0.01$).

There are only modest correlations among the variables, which would be entered as regressors into regression models, except a correlation between sleep quality and ego depletion (i.e., r = −0.40). Further regression models did not have any problems at multicollinearity indices such as variance inflation factor, tolerance, eigenvalue, and condition index [40].

Table 4 shows the results of hierarchical regression analyses which were conducted to test the hypotheses. As can be seen in Model 1, sleep quantity has a negative relationship with ego depletion (B = −0.065, $p < 0.05$), and sleep quality also has a negative relationship with ego depletion (B = −0.101, $p < 0.001$). These data support Hypothesis 1 (a) and 1 (b).

As can be seen in Model 3 and 5, ego depletion does not have any significant relationships with plagiarism (B = 0.102, not significant) and ATAD (B = 0.051, not significant), respectively. These data do not support Hypothesis 2.

As can be seen in Model 2 and 4, sleep quantity does not have any significant relationships with plagiarism (B = −0.023, not significant) and ATAD (B = 0.012, not significant), respectively. These data do not support Hypothesis 3 (a). Sleep quality has significant relationships with plagiarism (B = −0.031, $p < 0.1$) and ATAD (B = −0.072, $p < 0.001$). These data support Hypothesis 3 (b).

All four indirect effects of sleep on academic dishonesty through ego depletion were not supported, as the bias-corrected bootstrap 95% confidence intervals contain 0 [41]. These data do not support Hypothesis 4 (a) and 4 (b).

Figure 1 summarizes the results of mediation models: total effects of sleep on academic dishonesty, direct effects of sleep on academic dishonesty, and indirect effects of sleep on academic dishonesty through ego depletion.

Table 4. Regression results of mediation models.

| | Ego Depletion | | Academic Dishonesty | | | |
| | | | Plagiarism | | ATAD | |
	Model 1		Model 2	Model 3	Model 4	Model 5
Intercept	4.682	***	2.335 ***	1.858 ***	3.423 ***	3.187 ***
	(0.327)		(0.439)	(0.517)	(0.439)	(0.590)
Gender	0.181	+	0.139	0.121	−0.163	−0.172
	(0.108)		(0.121)	(0.120)	(0.138)	(0.137)
Time demand	0.002		0.006	0.006	−0.001	−0.001
	(0.004)		(0.005)	(0.005)	(0.006)	(0.006)
Exercise	−0.027		0.009	0.012	−0.030	−0.029
	(0.020)		(0.022)	(0.022)	(0.022)	(0.022)
Sleep quantity	−0.065	*	−0.023	−0.016	0.012	0.015
	(0.033)		(0.039)	(0.039)	(0.042)	(0.042)
Sleep quality	−0.101	***	−0.031 +	−0.021	−0.072 ***	−0.067 **
	(0.017)		(0.018)	(0.018)	(0.020)	(0.022)
Ego depletion				0.102		0.051
				(0.064)		(0.080)
R^2	0.187		0.030	0.039	0.065	0.066
Adj. R^2	0.170		0.009	0.014	0.045	0.042
F−value	13.1	***	1.5	1.6	3.2 **	2.8 *

Note: $^+$ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; Huber–White heteroscedasticity-consistent standard errors in parentheses.
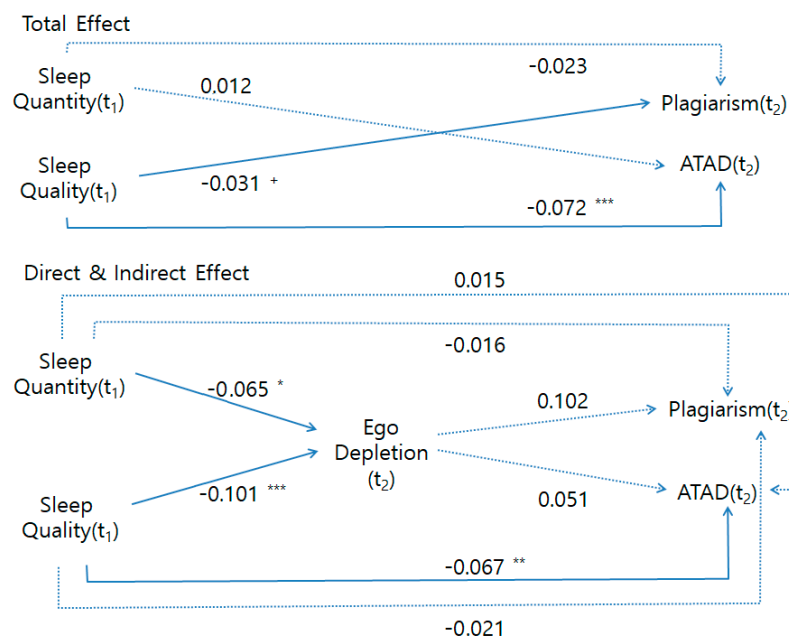

Figure 1. Depiction of results: total effects of sleep on academic dishonesty, direct effects of sleep on academic dishonesty, and indirect effects of sleep on academic dishonesty through ego depletion. Note: the numbers are unstandardized coefficients in Table 4; $^+$ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Indirect effect of sleep quality through ego depletion on plagiarism: $-0.101 \times 0.102 = -0.010$; the bias-corrected bootstrap 95% confidence interval (-0.025, 0.003), 90% confidence interval (-0.022, 0.001) over 5000 iterations.

Indirect effect of sleep quality through ego depletion on ATAD: $-0.101 \times 0.051 = -0.005$; the bias-corrected bootstrap 95% confidence interval (-0.023, 0.012), 90% confidence interval (-0.019, 0.009) over 5000 iterations.

5. Discussion

The results of this study were as follows: (1) sleep quantity and sleep quality have negative relationships with ego depletion; (2) ego depletion has no significant relationship with plagiarism or ATAD; (3) sleep quantity has no relationship with plagiarism or ATAD; (4) sleep quality has negative relationships with plagiarism and ATAD; (5) all four indirect effects of sleep quantity and sleep quality on plagiarism and ATAD through ego depletion are not significant.

The results of this study showed that millennials with sleep problems are more likely to behave unethically, including being academically dishonest. Barnes et al. [14] showed that cognitive fatigue mediates the relationship between sleep quantity and unethical behavior at work. Christian and Ellis [15] also showed that self-control mediates the relationship between sleep deprivation and workplace deviance or theft. Welsh et al. [16] showed that ego depletion mediates the relationship between sleep deprivation and deceptive behavior. We can expect from Welsh et al. [17]'s results the mediation effect of ego depletion on the relationship between sleep quantity and sleep quality, and unethical decision making.

Compared to these studies, the results show two unique characteristics. First, ego depletion has no significant effect on academic dishonesty, including plagiarism and ATAD. Furthermore, all four indirect effects of sleep quantity and sleep quality on plagiarism and ATAD through ego depletion are not significant. The result is similar to study 2 of Barnes et al. [14]. Only sleep duration has a negative impact on cheating behavior, whereas cognitive fatigue has no impact on cheating behavior. Barnes et al. [14] did not explain exactly why this kind of result happened.

Seuntjens et al. [10] suggests a possible reason for this kind of result. Although people can self-regulate their unethical behaviors when their willpower is stronger than their desire, prior studies on self-regulation and unethical behavior have typically focused on low willpower (i.e., ego depletion) instead of strong desire as the reason for self-regulatory problems. These studies, including the current study, have not controlled the level of desire in relation to unethical behaviors. For instance, if people did not have any desire to behave in an academically dishonest way, they would not have done it, despite being ego-depleted.

Second, only sleep quality affects academic dishonesty, including plagiarism and ATAD, whereas sleep quantity has no effect on them. Sleep quality was shown to be a more important cause of unethical behavior than sleep quantity. Prior studies reported that sleep quality is more related to dependent variables than sleep quantity. For instance, Henderson and Horan [42] showed that sleep quality is more related to work performance than sleep quantity through the meta-analysis.

This study also empirically examined dynamic employee characteristics as antecedents of the academic dishonesty of millennial college students. Sleep quantity and sleep quality are employees' individual differences, which may vary over time [14]. Prior studies have examined relatively static individual differences, such as conscientiousness, agreeableness, general mental ability, sex, age, emotional stability, extraversion, and openness to experience, as antecedents of academic dishonesty [18].

The results are more trustworthy than those in other studies, because this study has a rigorous research design, which separates the time to measure sleep and the time to measure unethical behavior like Barnes et al. [14], Christian and Ellis [15], and Welsh et al. [16,17]. Millennial students are well aware of plagiarism. Related education has been given to college students in Korea extensively.

This study empirically examined the relationship between sleep and unethical behavior of millennials, who are becoming mainstream workers and business leaders in the world [1–3]. They are assumed to be more aware of social responsibility than previous generations, and more narcissistic and materialistic than other generations were at their age [1,7–9]. Their interconnectedness through IT may generate sleep problems. First, it is difficult to say that millennials are more ethical than other generations. The mean values of plagiarism and ATAD are 1.95 and 2.29 in this study. As Bolin [20] did not report the mean value of ATAD in his study, we cannot compare the values. Indirectly, the

mean value of unethical behavior at work is 1.9 in study 3 of Barnes et al. [14]. We cannot find any distinct difference between them.

Second, millennials have many sleep problems in this study. They sleep less than 7 h, only 6 h and 42 min. The average amount of sleep of U.S. citizen is 7 h and 45 min [43]. Millennials in this study sleep 1 h less than average U.S. citizen. They also have sleep quality issue. The range of sleep quality is very broad from 4 to 20 among the possible range between 0 and 20. Almost 30 percent of them usually sleep at 2 a.m. and after. Eight percent of them usually sleep at 3 a.m. and after (see Table 1).

The results have implications for managers. Managers need to handle sleep issues of millennial workers in order to make ethical workplaces that might be sustainable. Barnes [44] suggests some strategies for avoiding and mitigating the effects of sleep problems. There are preventive strategies, such as managing sleep hygiene of employees, encouraging strategic naps, allowing sleep-friendly work schedules, and minimizing work stress and related anxiety. There are mitigating strategies, such as assigning workers with sleep issues tasks that are less vulnerable to working while sleepy, limiting the amount of time spent on a specific task, scheduling good breaks, serving stimulants such as caffeine, and working in teams with sleepy workers and normal workers. In particular, managers might have some policies or incentives of not using electronic devices at midnight and after for millennials. For instance, managers may provide incentives for workers not using electronic devices at midnight and after, like some companies that give employees incentives to stop smoking.

There are limitations to this study and suggestions for future research. First, future research needs to control a person's desire to behave unethically to examine the relationship between ego depletion and unethical behavior based on Seuntjens et al.'s [10] suggestions. Although unethical behavior is a function of willpower and desire, this study only examined willpower and ego depletion. A person's desire to behave unethically could be a moderator influencing the relationship between sleep and unethical behavior. If desire is low, then even an ego-depleted person does not behave unethically. If the desire is high, then a depleted person is more likely to behave unethically than a less-depleted person.

Finally, because the sample completed two surveys with all self-rated variables, future research needs to further limit the potential for common method effects by making a focal person's manager rate their unethical behavior, and by partialing out the effects of trait affectivity.

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