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Emotional Exhaustion and Sleep Problems in University Students:

Does Mental Toughness Matter?

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Abstract

The aim of this two-wave prospective study was to examine the relationship between emotional exhaustion (a key dimension of academic burnout), mental toughness, and sleep problems. A sample of 227 Chinese university students completed measures of these variables at baseline and then again three months later. When the cross-sectional data were examined, mental toughness predicted lower levels of emotional exhaustion and fewer sleep problems. Emotional exhaustion was positively correlated with sleep problems. In addition, mental toughness moderated the relationship between emotional exhaustion and sleep problems. When the prospective data were examined, sleep problems at baseline predicted increases in emotional exhaustion over the study period. These findings provide some evidence that mental toughness can buffer the relationship between exhaustion and sleep problems. The findings also provide evidence that, in university students, sleep problems are involved in the development of emotional exhaustion over time.

Keywords: academic burnout, higher education, mentally tough, adolescents, well-being

University Students' Emotional Exhaustion and Sleep Problems:

Does Mental Toughness Matter?

University students grapple with a variety of demands. These include meeting academic expectations, navigating through interpersonal relationships, and dealing with financial pressures (Brand et al., 2014). When these demands become excessive they can result in decreased motivation, increased stress, and elevated academic burnout. Academic burnout is conceptualized through three components - emotional exhaustion, cynicism, and decreased academic efficacy (Schaufeli, Martinez, Pinto, Salanova, & Bakker, 2002). This conceptualization is similar to work burnout, except that the former concerns the school setting, while the latter concerns the work domain. Currently, nearly a third of students suffer from stressor academic burnout (Auerbach et al., 2016; Ibrahim, Kelly, Adams, & Glazebrook, 2013). Worryingly, academic burnout has been found to have long-term negative effects on students' educational aspirations, attainment, and general well-being (Salmela-Aro & Upadyaya, 2017). Consequently, it is imperative to examine factors that may precipitate, maintain, or result from academic burnout.

In addition to academic burnout, a growing health concern among university students are sleep problems such as difficulty falling asleep, early awakenings, and poor restorative sleep (Schlarb, Kulessa, & Gulewitsch, 2012). Similarly, the prevalence of insomnia has been found to be as high as 40% among university students (Jiang et al., 2015). Sleep problems have been linked to numerous negative physical and psychological health problems such as emotional fluctuation, memory loss, and poor life satisfaction (Arbabisarjou et al., 2016). Moreover, sleep problems hinder students from working through their stress and managing their fatigue (Ratcliff & Van Dongen, 2009). Given that academic burnout and sleep are vital factors contributing to university students' overall well-being, it seems pertinent to explore their association.

The Relationship Between Academic Burnout and Sleep

Academic burnout and sleep have been found to independently predict negative outcomes such as deterioration of academic performance, illnesses, and fatigue (Haghighi & Gerber, 2019; Lyndon et al., 2017). However, little is known if there is a bidirectional link between academic burnout and sleep among university students (Pagnin et al, 2014). On one hand, individuals with high levels of burnout often feel stressed and worried, and may even develop psychosomatic illnesses, resulting in various sleep-related difficulties (Lehto, Kortesoja, & Partonen, 2019; Söderström, Jeding, Ekstedt, Perski, & Åkerstedt, 2012). On the other hand, given that sleep has the potential to restore daily functioning and aid in recovery from stress, impaired sleep may, in turn, result in the experience of burnout (Jansson-Fröjmark & Lindblom, 2010; Söderström et al., 2012).

In support of these propositions, Lehto et al. (2019)'s cross-sectional study with secondary and vocational school students found that poor sleep quality positively predicted academic burnout. Similarly, cross-sectional and prospective studies found that those medical students with higher sleep quality experienced less academic burnout (Arbabisarjou et al., 2016; Wolf & Rosenstock, 2017). As such, it appears that sleep problems precede academic burnout. However, academic burnout may precede sleep problems. Pagnin et al. (2014)'s cross-sectional study demonstrated that among their sample of medical students, emotional exhaustion and daytime sleepiness mutually influenced one another. However, the bidirectional associations between the other two burnout components and daytime sleepiness were not evident in their study. Moreover, findings from longitudinal studies with working or athletic populations did not fully support the bidirectional relation. For example, Jansson-Fröjmark and Lindblom (2010) found that insomnia was only positively related to emotional exhaustion in the working population and none of the burnout components predicted insomnia. Ina sample of athletes, Li, Ivarsson, Stenling, and Wu (2018)'s work demonstrated

that burnout negatively affected sleep quality, but not vice versa. The inconsistencies in the literature may be due to the varied study characteristics across studies (e.g., study design, outcome measure, study population, and potential moderator), suggesting a need to examine the directionality between burnout and sleep further. In addition, the present study focused on examining whether the relationship between academic burnout and sleep could be moderated by mental toughness.

Mental Toughness, Academic Burnout, and Sleep Problems

Mental toughness is defined as the ability to remain determined, focused, and confident in the face of stress or adversity (Clough, Earle, & Sewell, 2002). Recent cross-sectional and prospective studies suggest that students with higher levels of mental toughness tend to have higher psychological well-being, better academic performance, and lower levels of perceived stress (Brand et al., 2016; Crust et al., 2014; Gerber et al., 2015). With these identified associations, it could be expected that mental toughness may be related to academic burnout and sleep. Indeed, cross-sectional studies with secondary school, vocational, and medical students have found a negative association between mental toughness and academic burnout (Cheung & Li, 2019; Gerber et al., 2015; Haghighi & Gerber, 2019).

According to the findings from recent studies, mental toughness could also be associated with sleep quality. For example, Brand et al. (2014)'s cross-sectional study found that adolescents with high levels of mental toughness had better objective sleep quality compared to peers with low mental toughness. More recently, young adolescents and medical students with low levels of mental toughness were also found to be vulnerable to poor sleep quality (Brand et al., 2016; Gerber et al., 2015; Haghighi & Gerber, 2019). These findings point to the likelihood of mental toughness being a positive predictor of sleep quality among university students.

Aside from acting in a predictive capacity for academic burnout and sleep, mental toughness may also play a buffering role in relationship between burnout and sleep. Indirect evidence is available to support this proposition. For example, Haghighi and Gerber (2019), in their cross-sectional study among medical students, found that high levels of stress were associated with increased depressive symptoms among students with lower levels of mental toughness. Gerber et al. (2018) in their cross-sectional and prospective survey studies too found that young elite athletes with higher levels of mental toughness reported fewer mental health issues when under high stress, as compared to those with lower levels of mental toughness. Indeed, individuals with high levels of mental toughness may more capable to deal with their burnout symptoms, thereby facilitating their sleep quality. It is also possible that improved sleep quality, because of high levels of mental toughness, may aid in restoring stress-induced symptoms (Lin, Mutz, Clough, & Papageorgiou, 2017). However, as of yet, no direct evidence is available to support these assertions.

Aim and Hypotheses

This two-wave prospective study was undertaken to examine the relationships between mental toughness, academic burnout, and sleep problems. Of note, the scope of the present research is limited to examining emotional exhaustion, a traditional key dimension of burnout (Cordes & Dougherty, 1993) and an essential focus for those involved in education (Lee, Choi, & Chae, 2017; Schaufeli et al., 2002). Based on the theoretical and empirical rationale articulated above, it was expected that mental toughness would be a negative predictor of sleep problems and emotional exhaustion (H1a and H1b). It was also expected that emotional exhaustion would positively predict sleep problems and vice versa (H2a and H2b). Finally, mental toughness was expected to moderate the predicative ability of emotional exhaustion on sleep problems as well as the effect of sleep problems on emotional

exhaustion (H3a and H3b). These hypotheses were tested both cross-sectionally and prospectively over the two waves.

Method

Design

A two-wave prospective design was used. The baseline data (T1) was collected during early stage of a fall semester and participants were followed up three months later (T2), which was close to the end of the semester.

Participants

Participants ($n = 227$) at baseline were second year students from a public university located in southern China. The majority of participants were female ($n = 174$, 76.7%) and they had a mean age of 17.85 years ($SD = 0.54$). The participants majored in a wide range of subjects such as applied economics, electronic information engineering, and statistics. Eight participants did not complete the survey at T2. There were no age and gender differences between those who completed the survey and those who dropped out at T2 (ps > .05).

Measures

Three standardized (sub)scales were used to measure the variables of interest (emotional exhaustion, sleep problems, and mental toughness). Emotional exhaustion and sleep problems were measured at both T1 and T2, mental toughness was measured at T1 only.

Emotional exhaustion. The emotional exhaustion subscale of the validated Chinese version of the Maslach Burnout Inventory-Student Survey was used to assess participants' emotional exhaustion at both T1 and T2 (Hu & Schaufeli, 2009; Schaufeli, Martinez, Pinto, Salanova, & Bakker, 2002). This subscale consists of five items (e.g., "I feel used up at the end of a day in school"). Participants rated the items on a 7-point scale, ranging from 0 (*never*) to 6 (*always*). A mean subscale score was computed for further analyses. A higher

subscale score represents a greater level of emotional exhaustion. In the current samples, the emotional exhaustion subscale demonstrated good internal consistency (T1 α = .84, T2 α = .89).

Sleep problem. The validated Chinese version of the Pittsburgh Sleep Quality Index was used to measure participants' subjective sleep quality across both waves (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989; Guo, Sun, Liu, & Wu, 2016). Participants were asked to answer 18 items, consisting of open-ended questions (e.g., "When have you usually gone to bed?") or self-rated statements (e.g., "During the past month, how often have you had troubles sleep because you feel too hot"). A 4-point scale which ranges from 0 (*not during the past month/very good*) to 3 (*three or more times each week/very bad*) was used for rating. According to the scoring protocol (Buysse et al., 1989), a global sleep score was calculated for subsequent analyses. A higher total score suggests a more severe sleep problem. The scale showed adequate internal consistency with the current samples (T1 α = .69, T2 α = .74).

Mental toughness. The validated Chinese version of the Mental Toughness Index was utilized to assess participants' mental toughness at T1 (Gucciardi, Hanton, Gordon, Mallett, & Temby, 2015; Li, Zhang, & Zhang, 2019). The scale has eight items (e.g., "I consistently overcome adversity"). Responses were made on a 7-point scale ranging from 1 (*false, 100% of the time*) to 7 (*true, 100% of the time*). An averaged scale score was computed for further analyses. A higher mean scale score indicates a better mental toughness level. The scale had good internal consistency in our baseline sample (T1 α = .93).

Procedures

Prior to conducting the present research, the study procedure was approved by the university's Human Research Ethics Committee (no.2017-2018-0093). Upon receiving the ethical approval, an invitation letter together with the information sheet were sent to four course lecturers from a public university in the south of China. All four lecturers agreed to

invite their students to participate in this survey study. After obtaining participants' written informed consent at T1, the anonymous multi-section survey form was administered to participants under the supervision of a course lecturer and a research assistant in a lecture hall. A total of 227 surveys was returned, corresponding to a response rate of 93.4%. Among those whom returned the survey form at T1, 219 completed another survey form at T2 by following the same data collection procedure (response rate = 96.5%). For each wave of data collection, participants spent approximately 20 min to complete the survey without receiving incentives.

Data Analysis

First, descriptive statistics and zero-order correlations among study variables were computed. Then, simultaneous multiple regression analyses were conducted to test the proposed hypotheses using both baseline and prospective data. When examining the prospective data, we regressed T2 sleep problems on T1 mental toughness, T1 emotional exhaustion, and their interaction term (T1 emotional exhaustion × T1 mental toughness) after controlling for T1 sleep problems to test H1a, H2a, and H3a. Similarly, T2 emotional exhaustion was regressed on T1 mental toughness, T1 sleep problems, and their interaction (T1 sleep problems × T1 mental toughness) after controlling for T1 emotional exhaustion to test H1b, H2b, and H3b. The same procedures were followed when analyzing the cross-sectional data except that the baseline data of the dependent variable was not included. These analyses were conducted using IBM SPSS Statistics 25 (IBM, Armonk, NY, USA). In the event that there was an interaction effect, a simple slope analysis ($M \pm 1$ SD) was conducted to plot the effect (Aiken & West, 1991). As the simple slope analysis is based on a few arbitrary points ("pick-a-point approach"), the Johnson-Neyman technique was used to examine the specific value of the moderator for which the effect of the independent variable on dependent variable ceases to be significant (Carden, Holtzman, & Strube, 2017). Both

analyses were conducted using CAHOST, which is a free Microsoft Excel workbook (for details, see Carden et al., 2017).

Results

Descriptive statistics and zero-order correlations of study variables are presented in Table 1. As expected, T1 mental toughness was negatively related to T1/T2 emotional exhaustion and T1/T2 sleep problems (r = -.17 to -.30, ps < .01). T1/T2 sleep problems and T1/T2 emotional exhaustion were positively related to one another (r = 22 to .35, p < .001). T1 age and T1 gender were not related to any of the major study variables (r = -.06 to .09, ps > .05), and thus they were not controlled for in the regression analyses.

The results of the regression analyses are shown in Table 2. In line with H1a and H2a, T1 mental toughness negatively predicted T1 sleep problems (β = -.24, p < .001) while T1 emotional exhaustion was a positive predictor (β = .27, p < .001). In support of H3a, the interaction term between T1 emotional exhaustion and T2 mental toughness negatively predicted T1 sleep problems (β = -.13, p = .04). These three predictors explained 19% of the total variance in T1 sleep problems.

The findings of the simple slope analysis indicated that higher levels of T1 mental toughness were associated with weaker effects of T1 emotional exhaustion on T1 sleep problems (B = 0.91, SE = 0.21, 95%CI [0.49, 1.32]) as compared with lower levels of T1 mental toughness (B = 0.41, SE = 0.19, 95% CI [0.04, 0.77]). In other words, T1 mental toughness buffered the effect of T1 emotional exhaustion on T1 sleep problems (see Figure 1). Figure 2 presents the regions of significant moderation effect based on the Johnson-Neyman technique. According to this figure, the effect of T1 emotional exhaustion on T1 sleep problems was no longer significant when values of T1 mental toughness were equal to or higher than 6.31.

H1b was supported as T1 sleep problems was found to positively predict T1 emotional exhaustion ($\beta = .30$, $p < .001$). T1 emotional exhaustion was negatively predicted by T1 mental toughness ($\beta = -.14$, $p = .04$), supporting H2b. However, H3b was not supported given that the interaction term between T1 sleep problems and T1 mental toughness did not predict T1 emotional exhaustion ($\beta = -.05$, $p = .50$). These three predictors explained 15% of the total variance in T1 emotional exhaustion.

When the prospective data were examined, T1 mental toughness, T1 emotional exhaustion, and their interaction term were not found to predict T2 sleep problems ($\beta = -.004$ to .05, ps > .05). Thus, H1a, H1b, and H1c were not supported. H2a and H2c were also not supported as T2 emotional exhaustion was not predicted by T1 mental toughness ($\beta = -.09$, $p = .18$) as well as the interaction term between T1 mental toughness and T1 sleep problem ($\beta = .06$, $p = .36$). However, T1 sleep problems was a positive predictor of T2 emotional exhaustion ($\beta = .16$, $p = .02$), supporting H2b.

Discussion

This two-wave prospective study examined the relationships between mental toughness, sleep problems, and emotional exhaustion in university students. When the cross-sectional data were examined, mental toughness predicted lower levels of emotional exhaustion and fewer sleep problems. Emotional exhaustion was positively correlated with sleep problems. In addition, mental toughness moderated the relationship between emotional exhaustion and sleep problems. When the prospective data were examined, sleep problems at baseline predicted increases in emotional exhaustion over the study period. However, no other prospective effects were found.

Mental toughness negatively predicted sleep problems at the cross-sectional level. This supported our hypothesis 1a. This finding is in line with previous cross-sectional research with young adolescents and medical students (e.g., Brand et al., 2016; Haghighi &

Gerber, 2019). A possible explanation for these findings might be related to the association of mental toughness to lower stress and depressive symptoms, as well as to higher levels of physical activity (Brand et al., 2018; Cheung & Li, 2019). Lower stress and depressive symptoms, and increased physical activity, in turn, have been found to be significant predictors of good sleep (Arbabisarjou et al., 2016). Despite the cross-sectional findings, mental toughness did not predict sleep problems in the prospective data when controlling for baseline sleep problems. Consequently, although there is some initial evidence for the buffering effect of mental toughness in the relationship between emotional exhaustion and sleep problems, further research is required to determine when this relationship exits and when it does not.

Mental toughness was also found to negatively predict emotional exhastion at the cross-sectional level (supporting Hypothesis 1b). The hypothesis was supported (see Table 1) when T1 emotional exhaustion and T1 sleep problem were not controlled in the regression model using the prospective data. This finding is congruent with prior research (e.g., Gerber et al., 2015; Haghighi & Gerber, 2019), where a negative association between mental toughness and emotional exhaustion was found. Early research (e.g., Kaiseler, Polman, & Nicholls, 2009) has suggested that mentally tough individuals are inclined to perceive stressful circumstances as controllable and employ problem-oriented coping strategies. Thus, mental toughness can be considered as a coping resource for preventing emotional exhaustion. Of note, T1 mental toughness was no longer a predictor of T2 sleep problem and T2 mental toughness after controlling other variables using the prospective data. These findings suggest that mental toughness plays a minimal role in predicting these two outcomes across three months when other controlling variables are accounted for.

Mental toughness emerged as a potential moderator of the relationship between emotional exhaustion and sleep problem was explored. This finding supports our Hypothesis

3a. Interestingly this effect became nonsignificant at higher levels of mental toughness, rather than at lower levels. As to explaining this effect, it is plausible that individuals with higher levels of mental toughness do not present with or have fewer sleep or emotional exhaustion problems to begin with. Under such circumstances, there may not be a significant role for mental toughness to play. This finding is important as it highlights the possible resourcefulness of mental toughness in terms of fostering psychological well-being among university students. Despite these possible explanations, it is important to note that the aforementioned moderation effect was not evident in the prospective data. It may be that the time interval between the two waves was too short for mental toughness to play a moderation role. This possibility should be examined in future studies.

While previous cross-sectional research (e.g., Arbabisarjou et al., 2016; Lehto et al., 2019) has identified a bidirectional (i.e., reciprocal) associations between emotional exhaustion and sleep problems in student populations, our results based on the prospective did not. Instead, we found that sleep problems predicted increased emotional exhaustion over the study period. This finding is similar to the study by Elfering and colleagues (2018), in which they found baseline sleep problems predicted occurrences of emotional exhaustion three years later among working participants. Given that sleep serves the function of restoring daily functioning and energy, it is highly possible that impaired sleep will result in experience of stress and emotional exhaustion (Li et al., 2018; Söderström et al., 2012). In addition, and congruent with the present findings, Jansson-Fröjmark and Lindblom (2010)'s one-year prospective study with workers also found that sleep problems predicted emotional exhaustion (and that emotional exhaustion did not predict sleep problems). However, the work by Li et al. (2018) demonstrated that athlete burnout affected sleep quality across five months. This disparity may be attributed to the different study characteristics such as outcome measures, study populations, and potential moderators.

Limitations and Future Directions

The present study has a number of limitations First, participants were Chinese students from a public university and, therefore, the findings may not generalize beyond the present context. As such, future research may benefit from examining these relationships in other student groups such as secondary school students. Second, we collected only two waves of data. This means that non-linear relationships could not be examined. Future research interested in the dynamic interplay between emotional exhaustion, sleep, and mental toughness could adopt more waves so as to examine such effects (e.g., quadratic relationships). Third, our data were obtained via self-report. Objective measures such as sleep accelerometry could be used in future studies so as to strengthen the reliability of our findings. Finally, although emotional exhaustion has been considered as a key dimension of burnout (Cordes & Dougherty, 1993), burnout is a multidimensional construct (including cynicism and reduced efficacy). Future research may therefore benefit from including these other two burnout dimensions to determine whether similar relationships emerge.

Conclusion

The findings of this two-wave prospective study provide some insight into the relationships between emotional exhaustion, mental toughness, and sleep problems. These findings provide some evidence that mental toughness can buffer the relationship between exhaustion and sleep problems. The findings also provide evidence that, in university students, sleep problems are involved in the development of emotional exhaustion over time.

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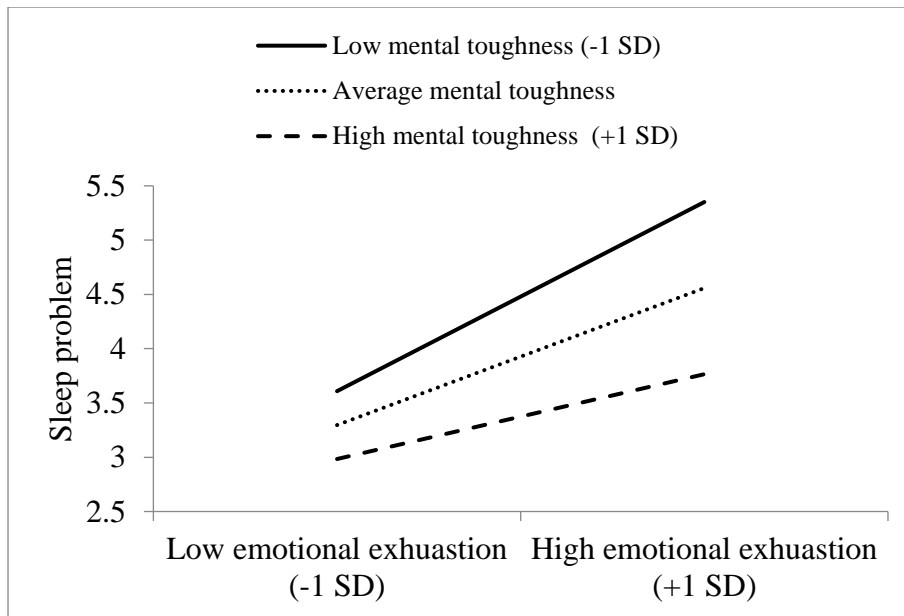
Figure 1. Association between emotional exhaustion and sleep problem at different levels of
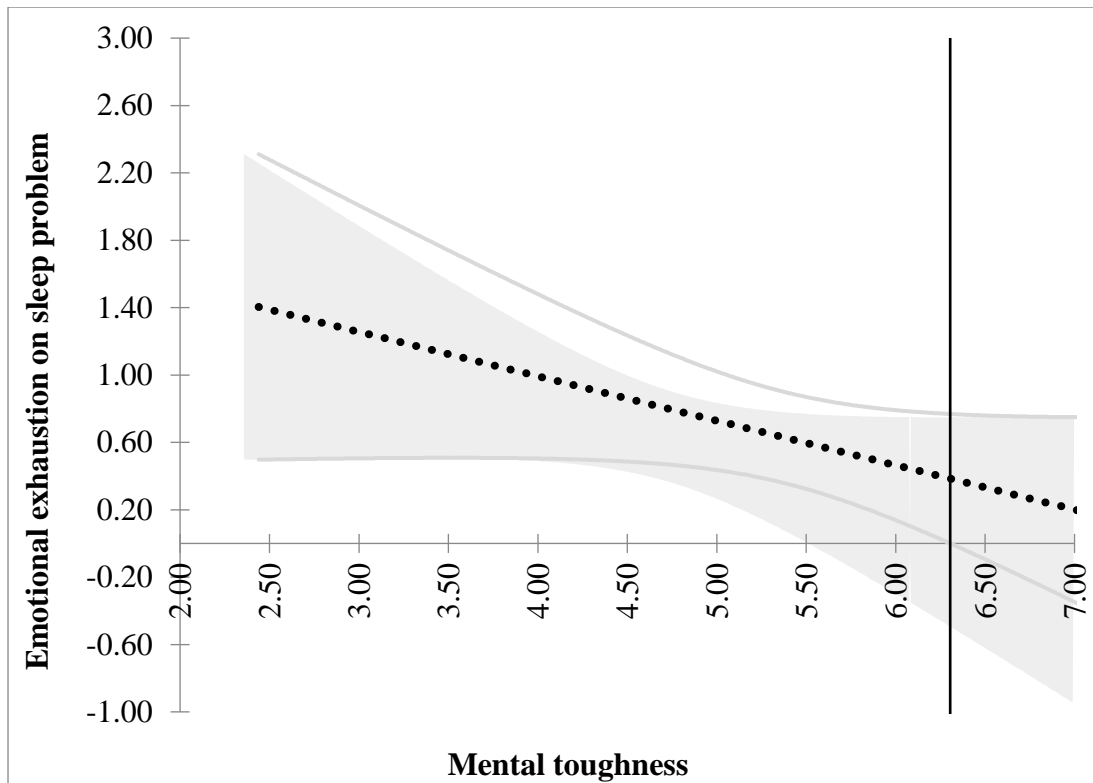
mental toughness at baseline (T1).

Figure 2. The Johnson-Neyman graph for probing the conditional association from emotional exhaustion to sleep problem as a function of mental toughness at baseline (T1). The horizontal line above zero marks the region of significance, namely the values of mental toughness for which the effect of emotional exhaustion on sleep problem ceases to be significant ($M \geq 6.31$).

Table 1

Descriptive Statistics, Internal Reliability and Zero-order Correlations of Study Variables

	1	2	3	4	5	6	7
1. Age	–						
2. Gender	-.06	–					
3. Mental toughness (T1)	-.04	.01	–				
4. Emotional exhaustion (T1)	.03	.05	-.25**	–			
5. Sleep problem (T1)	.09	.06	-.30**	.35**	–		
6. Emotional exhaustion (T2)	.01	-.01	-.20**	.42**	.29**	–	
7. Sleep problems (T2)	.02	-.06	-.17**	.22**	.53**	.35**	–
M	17.85	–	5.28	1.78	3.99	2.48	4.16
SD	0.54	–	0.95	0.96	2.33	1.27	2.34
α	–	–	.93	.84	.69	.89	.74

Note. ** $p < .01$, T1 = Baseline, T2 = Follow-up.

Table 2

Results of Multiple Regression Analysis

DV	Predictors	B	SE	95% CI	β	t	p	R^2
SP (T1)	MT (T1)	-0.58	0.15	[-0.89, -0.28]	-.24	-3.79**	<.001	.19
	EE (T1)	0.66	0.15	[0.35, 0.96]	.27	4.25**	<.001	
	EE × MT (T1)	-0.26	0.13	[-0.52, -0.01]	-.13	-2.06*	.04	
EE (T1)	MT (T1)	-0.15	0.07	[-0.28, -0.01]	-.14	-2.12*	.04	.15
	SP (T1)	0.12	0.03	[0.07, 0.18]	.30	4.51**	<.001	
	SP × MT (T1)	-0.02	0.03	[-0.07, 0.03]	-.05	-0.67	.50	
SP (T2)	SP (T1)	0.50	0.06	[0.38, 0.63]	.51	7.90**	<.001	.28
	MT (T1)	-0.03	0.15	[-.033, 0.28]	-.01	-0.17	.86	
	EE (T1)	0.11	0.15	[-0.19, 0.42]	.05	0.74	.46	
	EE × MT (T1)	-0.01	0.12	[-0.25, 0.24]	-.004	-0.07	.95	
EE (T2)	EE (T1)	0.48	0.09	[0.30, 0.65]	.36	5.47**	<.001	.21
	MT (T1)	-0.12	0.09	[-0.30, 0.06]	-.09	-1.33	.18	
	SP (T1)	0.09	0.04	[0.02, 0.16]	.16	2.40*	.02	
	SP × MT (T1)	0.03	0.03	[-0.03, 0.09]	.06	0.92	.36	

Note. DV = Dependent Variable, SP = Sleep Problem, EE = Emotional Exhaustion, MT = Mental Toughness, T1 = Baseline, T2 = Follow-up. *p < .05, ** p < .01.