

Effect of Nationality and Gender Differences on Postural Stability while Texting

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Abstract. Texting in Chinese is more difficult than in English due to there are thousands of Chinese characters. This study evaluated the effect of nationality and gender on postural stability while texting. Twenty college students (10 Taiwanese and 10 Indonesian) were asked to perform static and dynamic posture while texting. Traditional COP and multivariate multiscale entropy (MMSE) were used to assess the static postural stability and the Star Excursion Balance Test (SEBT) was used to assess the dynamic postural stability. Results showed (1) significant difference in sway area between nationalities while performing tandem stance and texting, (2) significant difference in mean response time and mental effort between nationalities while performing normal stance and texting, and (3) significant difference between genders in perceiving the task difficulty while performing normal stance and texting.

Keywords: Posture; Texting; College Students; Nationality; Gender.

1. INTRODUCTION

Nowadays, mobile phone is inseparable from our daily lives. College students are the most active mobile phone users, they use it in a great frequency just about anywhere (Stavrinos et al., 2011). Texting is the most common feature for college students, compared to phoning and listening the music. Texting is considered the most attentional demanding feature of mobile phone, it requires reading and typing that demand more cognitive attention (Schwebel et al., 2012). Previous study evaluated the effect of texting on college students found that texting impaired the postural stability, regardless of how good the young adults adjust themselves to the environment (Nurwulan et al., 2015).

Unlike typing in English, it is needed to tap the keyboard several times to type Chinese characters on mobile phone. Other than that, Chinese characters are composed of strokes that may influence the readability of the characters (Huang et al., 2009) and might need more attention in order to type the correct words. Previous study showed the difference of

distraction level of texting between genders (Hatfield and Murphy, 2007). Therefore, the aim of this study was to evaluate the effect of nationality and gender on postural stability while texting.

2. METHOD

Twenty college students, 10 Taiwanese and 10 Indonesian (mean 21.75 ± 1.59 years old) were recruited. All subjects were free of orthopedic and neurological disorder based on self-report. The study was approved by Taiwan Institutional Review Board and all participants signed consent form before participating in this study.

To measure the effect of texting on static postural stability, the subjects stood barefoot on the force platform performing normal and tandem stance without and with texting. The texting content was made in Chinese and English. Taiwanese students was required to type the Chinese paragraph, while Indonesian students was required to type the English paragraph. The star excursion balance test (SEBT) was used to evaluate

the dynamic postural stability. The subjects were required to perform the SEBT without and with texting. The order of the tasks were randomized in order to eliminate the learning curve effect that might affect the outcomes. Mackworth clock test

(MCT) and subjective rating scale were given to the subjects to measure the cognitive demand.

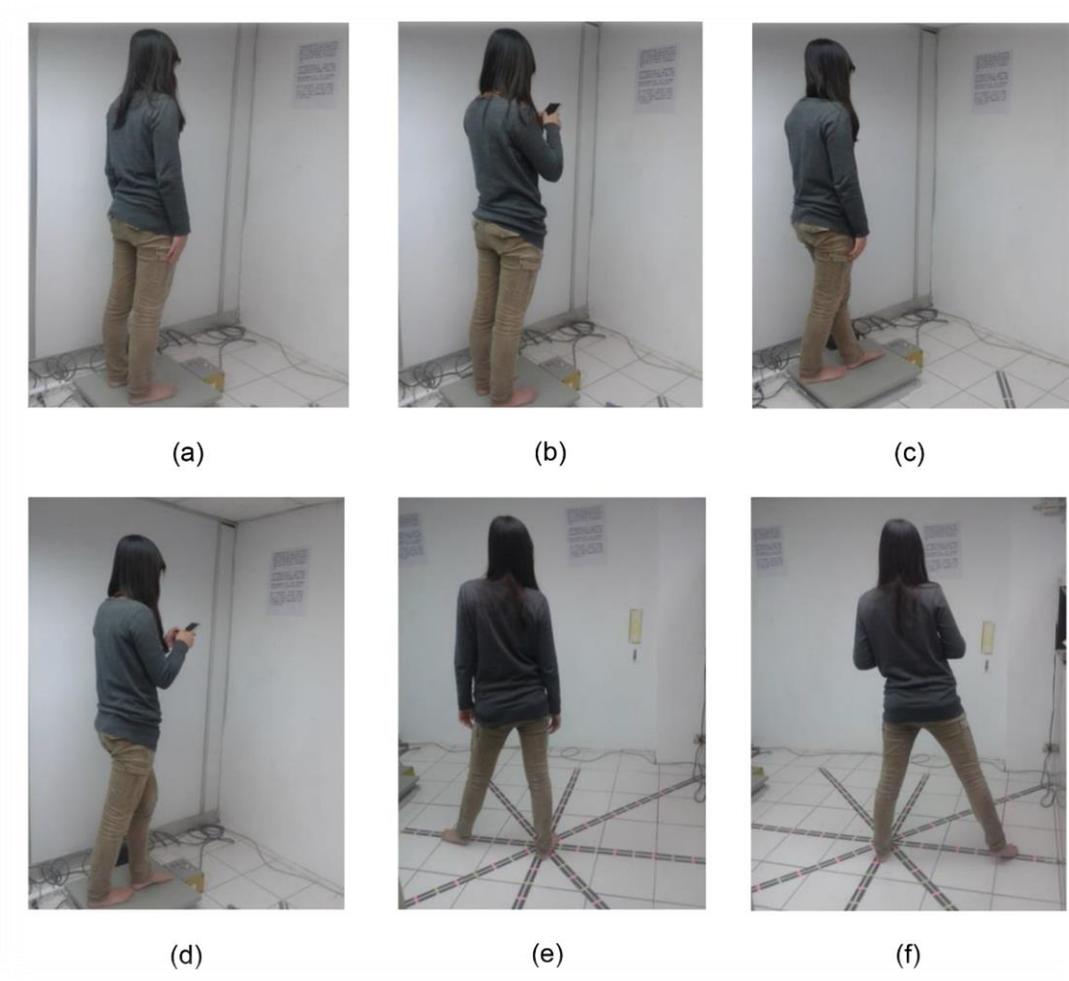


Figure 1: Task conditions.

The subjects stood barefoot, performing six different task conditions for 65 seconds: (a) normal stance, (b) normal stance and texting, (c) tandem stance (heel-to-toe), (d) tandem stance and texting, and (e) star excursion balance test, (f) star excursion balance test and texting.

3. RESULTS

The static postural stability data were analyzed by traditional center of pressure (COP) and multiscale entropy (MSE) methods. The results showed significant difference between Taiwanese and Indonesian in performing tandem stance and texting ($p = 0.039$). Taiwanese had bigger sway area than Indonesian.

The mediolateral mean velocity and mediolateral total excursion between nationalities while performing tandem

stance without texting were significantly difference ($p = 0.049$; $p = 0.049$, respectively). For the MSE analysis, the difference between genders was found in anteroposterior MSE for the tandem stance ($p = 0.041$).

The significant differences between nationalities were found in mean response time ($p = 0.041$) and mental effort ($p = 0.01$) while performing normal stance and texting task. Indonesian gave faster response and had less mental effort than Taiwanese. The significant difference was also found between genders in the way they perceived the task difficulty of performing normal stance and texting ($p = 0.031$). Female

subjects perceived the task more difficult than the male subjects.

4. DISCUSSION

From the above results it can be seen that the postural control between nationalities are different, Indonesian subjects have better balance in the tandem stance with texting. Taiwanese swayed more while performing the dual-task with tandem stance posture. Taiwanese had poorer balance in tandem stance without texting. However, there was no difference between nationalities in cognitive demand while performing tandem stance and texting. This does not mean it may not be the texting task that causes the poorer balance, because a previous study showed texting impaired the balance in tandem stance posture (Nurwulan et al., 2015). The difference between nationalities in cognitive demand also found in the normal stance with texting task and it showed that Taiwanese gave a slower response and had more mental effort.

The difference between genders was found in the anteroposterior MSE for the tandem stance. Male subjects had higher complexity than female subjects. It means the ability to adapt and function in a changing environment between genders in performing tandem stance was different. The difference between genders was also found in the perceiving task difficulty while performing normal stance and texting. Female subjects perceived the task as more difficult than male subjects.

The Taiwanese students had higher cognitive demand which caused the poorer balance might be due to texting in Chinese characters is more difficult than English words. The font size and display resolution affect the readability of Chinese characters on the mobile phone (Huang et al., 2009). Previous study by Chee et al. (2000) evaluated the semantic processing of Chinese characters, English words, and pictures using functional magnetic resonance imaging (fMRI) on English-Chinese bilingual subjects found that the semantic processing of Chinese characters shares greater similarities with English words than picture. Therefore, the difference in terms of difficulty in texting between Chinese characters and English words might not be because of Chinese characters composed of strokes. The difficulty in texting in Chinese might be eliminated by adjusting the font size and display resolution of the phone. For the deeper analysis, future research involving texting in Chinese characters should evaluate the effect of font size and display resolution of the phone on the postural stability.

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