

Phantom Vibration and Ringing is Linked to Poor Emotional Intelligence and Anxiety among Undergraduates

Zhao Qiankun, Zhou Ling, Wang Lijun*

College of Education, Zhejiang Normal University, Yingbin Road, Jinhua, China

*Corresponding author

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Abstract: Mobile phone use has been linked to phantom vibration and ringing; however, the role that it plays in the mental health of young adults, who are known to be heavy users of mobile phones, remains unexplored. Therefore, the aim of the present study was to explore the prevalence of phantom vibration and ringing among undergraduates and examine the relationship between phantom vibration and ringing, emotional intelligence, and anxiety. Accordingly, a survey was conducted with 311 Chinese undergraduates who responded to a questionnaire about phantom vibration and ringing, and assessments that measure emotional intelligence and anxiety. The results showed that more than half the sample and approximately 37% of the participants had experienced phantom vibration and ringing, respectively. Although a large percentage of the undergraduate sample did not find phantom vibration and ringing to be bothersome, some students reported that it caused them anxiety. Taken together, these results suggest that excessive phone use might lead to misinterpretations of sensory signals. These findings serve as an evidence-based cautionary note against excessive reliance on mobile phones.

1. Introduction

Young adults are the primary users of mobile phones, both in terms of duration and intensity of use. The dramatic increase in the use of mobile devices coincides with the emergence of problematic behaviors that are related to the use of mobile phones [1-2]. It is easy for those who are over-reliant on mobile phones to experience both phantom vibration syndrome and phantom ringing syndrome. Although these syndromes have attracted the attention of scholars [3-4], empirical research in this field is largely insufficient.

Rothberg et al. found that 68 % of medical staff had experienced phantom vibration and ringing syndrome [5]. Similarly, Yu-Hsuan Lin et al. conducted a survey among medical interns and found that the baseline rate of phantom vibration, which was 78.10 % before the commencement of the internship, had significantly increased to 95.90 % and 93.20 % by the 3rd and 6th months of the internship [6], respectively. Further, the baseline rate of phantom ringing was 27.40 % before the commencement of the internship and had significantly increased to 84.90 % and 87.70 % by the 3rd and 6th months of the internship, respectively.

Due to the widespread prevalence of phantom vibration and ringing (PVR), they may be considered to be normal behavior. Indeed, phantom vibration has been classified as feelings or perceptions in some studies [3,5]. Although there may be sensations that can cause phantom vibration (e.g., the feeling of clothes rubbing against the skin, muscle twitching) [5], these are, as the name suggests, phantom experiences. Therefore, it is inappropriate to classify them as feelings; instead, phantom vibration can be more appropriately classified as a perceptual experiences.

In the case of phantom vibration, repeated exposure to the actual vibrations of telephone alerts (e.g., caller tune, text messages) leads to perceptual learning [3], whereby vibrations become associated with alerts that are related to social communication. According to Rothberg et al., this is an adaptive process because phantom vibration may be an indicator of brain plasticity, which, in this case, pertains to the ability to form patterns that aid the interpretation of sensory stimuli.

In addition to research that has focused on PVR among medical staff, Laramie's doctoral

research examined the incidence of PVR in adults as well as the relationship between PVR, and impulses, phone-related problems, and phone abuse. Although different samples were studied across the two investigations, similar epidemiological statistics pertaining to phantom vibration emerged. Specifically, in both studies, approximately two-thirds of the participants had experienced phantom vibrations when they used their electronic devices (i.e., mobile phones or pagers) [4-5]. In sum, despite relying on very different samples, previous studies have shown that PVR are frequently experienced by most respondents.

The factors that trigger PVR are not fully understood. Rothberg et al. have suggested that PVR can be understood as an illusion, whereby the brain either perceives a feeling that does not actually exist or misinterprets sensory input as a telephonic signal. They have speculated that the illusion may originate in the cerebral cortex, which relies on filters and patterns that are influenced by expectations. Stimulations such as uncoordinated muscle contractions, constriction caused by tight clothing, ambient noises, or other audible signals, flashing lights, and related stimuli, may cause the brain to misperceive them as cell phone signals [4-5]. As a result of repeated exposure to actual telephone signals, one may learn to associate these signals with social communication alerts, thereby resulting in accessible patterns [7] and an increased probability of erroneous interpretations of arbitrary stimulations as telephonic signals.

PVR may be precipitated by stressful experiences; such a hypothesis is supported by the finding that a higher frequency of PVR is associated with higher depression and anxiety scores. Chen et al. did not find a direct relationship between PVR and either anxiety or depression; however, they did find a link between PVR and burnout, thereby suggesting that PVR may be caused, at least partially, by stress. In addition, two other studies that examined whether the use of mobile devices predicts PVR showed that those who frequently used mobile phones tended to experience PVR more frequently, as did those who often carried their mobile devices with them (e.g., pagers, cell phones) [5].

In this study, we examined the prevalence of PVR among college students, as well as the relationship between PVR, emotional intelligence, and anxiety. Factors that are related to PVR have been examined in previous studies. In general, these pertain to psychological characteristics, personality, stress, and job type. For example, Rosenberger studied the psychological features that are associated with phantom vibration syndrome and found that phantoms that function as normal brain mechanisms may be caused by misinterpretations of incoming sensory signals by the cerebral cortex.

Stress is another factor that plays an important role in phantom syndrome. In a longitudinal study on medical interns' changing experiences of phantom syndromes, Lin et al. found that the prevalence of phantom syndromes across the duration of medical internships could be represented as an inverted-U shaped curve. They concluded that "interns may be more nervous interns during their internships as medical students after the internship" [6].

2. Materials and methods

An online survey was conducted in January 2018. Responses were collected from 311 undergraduate students (110 men and 201 women) who were pursuing various professional courses in a university in China. The average age of the students was 20.27 years (SD = 2.35).

2.1 Measures

2.1.1 Phantom vibration and ringing survey

Survey questions that accurately assessed participant experiences of PVR were used. Specifically, respondents were required to indicate whether they had experienced PVR. Those who provided affirmative responses were asked about the frequency with which they had experienced PVR (response scale: 1 = monthly; 3 = daily) and whether they were bothered by it.

2.1.2 The self-rating anxiety scale

The Self-Rating Anxiety Scale is a self-report measure that is used to detect the symptoms of

anxiety (Zung). The composite scale score can be obtained by adding the individual scores of the 20 items; subsequently, the integer is to be multiplied by 1.25 to obtain the standard score.

2.1.3 The emotional intelligence scale

The Emotional Intelligence Scale, which is based on Mayer and Salovey's theory, has been reviewed by Schutte. The scale has been found to have adequate reliability ($\alpha = 0.83$).

3. Results

Unsurprisingly, students who had experienced phantom vibration ($t = 2.04$) as well as phantom ringing ($t = 3.03$) obtained higher anxiety scores than those who had not experienced them. Those who had not been bothered by PVR obtained significantly higher scores on the four dimensions of the Emotional Intelligence Scale and significantly lower anxiety scores than those who had been bothered by PVR. The results of the analysis of variance that was conducted to examine the effect that daily time spent on mobile phone has on anxiety. Consistent with our predictions, those who spent more time on their phones were more anxious than their counterparts. The results showed that demographic features accounted for a significant percentage of the variance ($R^2 = 0.27$, $F(3,310) = 38.44$, $p < 0.00$). The intensity of a phone call emerged as the strongest negative predictor of anxiety ($\beta = -0.41$, $t = -6.79$, $p < 0.00$), followed by the intensity of APP, which was as a positive predictor ($\beta = 0.37$, $t = 6.07$, $p < 0.00$). Intensity of phantom ringing emerged as a significant predictor of anxiety ($t = 2.42$, $p < 0.05$); however, phantom vibration did not emerge as a significant predictor ($t = 0.94$, $p > 0.05$).

4. Discussion

The findings of our study are consistent with the prevalence rates of PVR that have been established in past studies [5-7]. However, the percentages of participants who had been bothered by PVR was much higher in the present study than what has been found in previous research studies [4-5]. This difference may be attributable to sample characteristics. Specifically, our participants were young college students who are known to be heavy users of mobile phone technologies. The higher incidence of PVR in our sample might also be attributable to dramatic increases in mobile phone use in recent years. As previous research studies have shown, those who frequently use their phones are more likely to experience PVR [4].

Our results suggest that individuals who experience phantom vibration report greater anxiety than those who do not experience them; similar results emerged for phantom ringing. This suggests that hallucinations might have similar mechanisms. Specifically, participants may have felt a brief vibration or heard a brief bell that was disconfirmed after further inspection; this is similar to false reports of information. Because one's attentional resources are limited, greater overt focus on the phone will lower the threshold for hallucinations. Indeed, previous research has shown that intensive work during internship programs leads to both long-term and short-term alterations of autonomic nervous system regulation [6].

Given that PVR are ephemeral, the perceived vibration and ringing of mobile phones may satisfy individual psychological needs; consequently, they may experience pleasurable feelings and emotions, if the vibration and ringing is indeed true, or feel depressed, if the vibration and ringing is false. Excessive phantom falsification may lead to sensitivity and anxiety.

It is unsurprising that those who had not experienced phantom ringing obtained higher emotional intelligence scores than those who had experienced phantom ringing. This is because those who do not experience phantom ringing are able to pay more attention to the external reality of interpersonal relationships; indeed, greater offline communication leads to better emotional perception and management. This same explanation may account for the differences that emerged between participants who had and had not been bothered by PVR.

We found a relationship between daily time spent on the phone and PVR: the longer the phone is used, the more likely one is to experience PVR. Further, individuals who store personal information

on their phones are more likely to experience phantom signals.

Drouin et al. and Rothberg et al. speculated that prolonged and repeated exposure to actual phone signals may result in long-term accessible patterns, which in turn may increase the likelihood of misinterpretations of sensory stimuli as phone signals or the detection of phantom phone signals in the absence of sensory stimuli. This explanation is consistent with past findings that chronically accessible constructs induce a constant perceptual readiness that influences the interpretation of environmental stimuli [8-9]. As a result, long periods of mobile phone use lead to long-term accessible patterns, which in turn lead to the misinterpretation of phone signals. In addition, we contend that the perceived importance of phones may be related to PVR. Finally, we expected a number of factors to predict anxiety; consistent with our hypothesis, PVR was found to be related to anxiety.

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