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# Evaluating E-Cigarette Addiction in Thailand: Validation of Dependence Assessment Tools for Policy and Clinical Use

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## Abstract:

**Objective:** To adapt and validate the Penn State Electronic Cigarette Dependence Index (PS-ECDI) and the e-cigarette version of the Fagerström Test for Cigarette Dependence (e-FTCD) for use in Thailand and to assess the current status of e-cigarette addiction among Thai users.

**Material and Methods:** A systematic process of translation, cultural adaptation, and pilot testing of the PS-ECDI and e-FTCD was followed. Expert panel reviews, back-translation, and cognitive interviews were conducted to ensure cultural relevance and clarity. The instruments were administered to 193 Thai e-cigarette users. Internal consistency was assessed using Cronbach's alpha and validity was evaluated through correlation with the Substance Use Disorder Screening Test (SUDST). The current status of e-cigarette addiction was analyzed.

**Results:** The culturally adapted PS-ECDI demonstrated strong internal consistency, with a Cronbach's alpha of 0.87 and a robust correlation with SUDST. The e-FTCD had a Cronbach's alpha of 0.57. E-cigarette addiction was highly prevalent in the sample, with 65% of users exhibiting signs of dependence. Younger age, male sex, and concurrent use of other substances were significantly associated with higher levels of e-cigarette addiction.

**Conclusion:** Culturally adapted and validated tools are essential to measure e-cigarette dependence in Thailand. The validated PS-ECDI is a reliable instrument for health professionals and policymakers to assess e-cigarette dependence,

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facilitating the development of culturally informed public health interventions and regulatory frameworks. Further refinement of the e-FTCD is necessary to enhance its reliability. The high prevalence of e-cigarette addiction among Thai users underscores the need for targeted public health interventions.

**Keywords:** cultural adaptation, e-FTCD, electronic cigarette dependence, PS-ECDI, Thailand

## Introduction

The ever-increasing trend in electronic cigarette (e-cigarette) use, especially among adolescents and young adults, has catalyzed a significant transformation in Nicotine addiction dynamics[1]. This shift has global implications, profoundly impacting the Southeast Asian Region[2], notably Thailand, where e-cigarettes are still illegal[3–5]. Despite being marketed as a safer alternative to traditional cigarettes[6], e-cigarettes have drawn scrutiny from both scientific and regulatory bodies due to their harmful aerosols, which contribute to Nicotine addiction, increased toxin exposure, carcinogenesis, and cardiopulmonary issues[7,8]. The global community has responded with calls for strict regulations to protect young people from the allure of e-cigarettes[9,10].

In Thailand, social context, peer influence, previous smoking behavior and media literacy play pivotal roles in youth e-cigarette consumption[4]. The introduction of e-cigarettes with high Nicotine concentrations has resulted in growing dependence, posing a substantial public health challenge, particularly in a country marked by rich cultural diversity[6,11,12].

The Penn State Electronic Cigarette Dependence Index (PS-ECDI) and the e-cigarette version of the Fagerström Test of Cigarette Dependence (e-FTCD) are instruments with established development and validation processes that are widely recognized among researchers[13–15]. However, their direct translation for use in Thailand requires careful consideration of cultural and linguistic distinctions. This study aimed to adapt these instruments to the Thai context, thereby enabling more accurate assessments of Nicotine dependence to inform regulatory policies. Despite Thailand's anti-e-cigarette regulations, the issue of Nicotine addiction persists. The goal of this study was to refine these tools to align them with Thai cultural perspectives, ensuring that they provide an accurate measure of Nicotine dependence to support the creation of effective e-cigarette regulatory policies.

## Material and Methods

### Translation, cultural adaptation and pilot testing

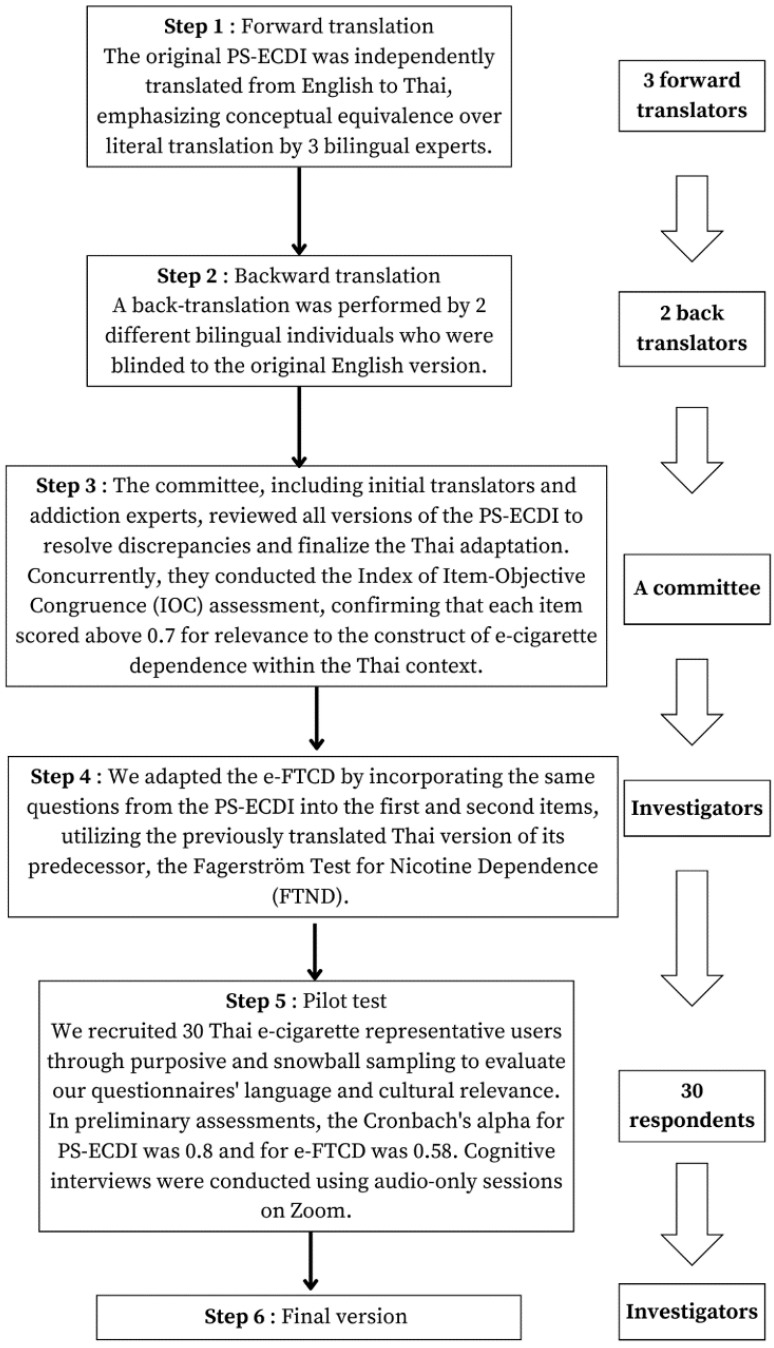
To address e-cigarette Nicotine dependence, we selected two established questionnaires for translation into Thai: PS-ECDI and e-FTCD. These instruments were chosen because of their widespread use in research and robust validation, making them appropriate for adaptation to the Thai context. Their established reliability and validity in diverse populations provide a strong foundation for their effective use in assessing e-cigarette dependence in Thailand[13–15]. PS-ECDI and e-FTCD are underpinned by a similar conceptual framework for evaluating e-cigarette dependence, ten and six items, respectively, two of which overlap. The translation process for the PS-ECDI involved three bilingual experts independently translating the English questionnaire into Thai, prioritizing conceptual equivalence. This was followed by back-translation by two other bilingual individuals who were blinded to the original. A committee of translators and addiction medicine experts reviewed all versions to resolve discrepancies and finalize the Thai

adaptation, ensuring cultural relevance. The committee also conducted a content validity assessment using the Index of Item-Objective Congruence (IOC). They evaluated each item for its relevance to the construct of e-cigarette dependence within the Thai context, there by affirming the cultural and contextual appropriateness of each item. All items scored above 0.7, meeting the required threshold for content validity. For the e-FTCD, we built on an existing Thai version of its predecessor, the Fagerström Test for Nicotine Dependence[16]. We adapted the e-FTCD by integrating the first two items from the PS-ECDI, corresponding to the overlapping questions.

We initially utilized purposive sampling to recruit representative Thai e-cigarette users, later expanding the sample through snowball sampling from local vaping communities and online forums. This strategy was essential because of the legal status of e-cigarettes in Thailand. We administered the adapted questionnaires to 30 participants via secure, anonymous online platforms and conducted cognitive interviews through audio-only focus groups on Zoom to ensure anonymity. The feedback affirmed the questionnaires' local contextual adaptation, and the committee retained the original wording of the questions. The preliminary internal consistency of the PS-ECDI and e-FTCD was satisfactory, with Cronbach's alpha values of 0.80 PS-ECDI and 0.58, respectively. A summary of the translation and adaptation processes for the PS-ECDI and e-FTCD in Thai is provided in Figure 1.

**Validity, reliability assessment, and comparative analysis**

Post-pilot testing, we distributed the revised questionnaires to a broader Thai e-cigarette user demographic using snowball sampling. Basic descriptive statistics captured the demographic and e-cigarette use characteristics. We reported frequencies and percentages for categorical variables, such as sex, religious affiliation, and educational attainment, and consolidated occupation into broader categories reflective of employment status and sector. Content validity was ensured by an expert panel review, achieving an Index of IOC greater than 0.7 for all items. We assessed reliability using Cronbach's alpha, deeming values of 0.7 or higher as indicating satisfactory internal consistency. We conducted a comparative analysis using Spearman's rho to correlate the PS-ECDI and e-FTCD scores with the Substance Use Disorder Screening Test (SUDST) scores. The SUDST was originally developed for methamphetamine users and is grounded in diagnostic and statistical manual of mental disorders, fifth edition criteria, and it aims to classify the severity of substance use disorders and screen for individuals at risk[17]. Given its Cronbach's alpha of 0.79, demonstrating high concordance with clinical diagnoses, and the challenges of involving psychologists for direct assessment in the context of illegal e-cigarette use, we chose the SUDST to serve as a proxy for evaluating the effectiveness of PS-ECDI and e-FTCD.




PS-ECDI=Penn State Electronic Cigarette Dependence Index, e-FTCD=e-cigarette version of the Fagerstörm Test of Cigarette Dependence

**Figure 1** Flowchart of the translation and adaptation process for the e-cigarette dependence questionnaires

## Results

From September to November 2023, the PS-ECDI and e-FTCD questionnaires were administered to 193 Thai individuals who used e-cigarettes to understand usage patterns and demographics. The participants' median age was 27 years (interquartile range (IQR)=24–31). Males accounted for 54.5% of the sample. A significant majority (91.2%) reported being Buddhist. When examining marital status, 79.8% were single. Educational attainment varied, with the largest proportion having completed middle school or lower (39.9%). Regarding occupation, the majority were either employees/farmers (50.2%) or freelance/self-employed (31.1%). Comorbidities were reported by 3.6% of participants. Regarding Nicotine and substance use, 57.0% of participants reported using manufactured cigarettes. Alcohol and Kratom consumption were 59% and 28.0%, respectively. The most popular type of e-cigarette among the participants included mods/tanks (43.0%). The median age at which the participants began using e-cigarettes was 21 years (IQR=24–31). The peak usage period for e-cigarettes was between 08:01 and 12:00, accounting for 27.5% of participants' usage. Table 1 presents a comprehensive overview of the baseline characteristics of the study participants.

The questionnaires' reliability, as measured by Cronbach's alpha, was found to be generally satisfactory, with the PS-ECDI yielding a value of 0.87, indicating strong internal consistency. The e-FTCD, however, scored a lower alpha of 0.57, reflecting moderate consistency and warranting further examination for potential refinement. The SUDST demonstrated robust reliability, with an alpha of 0.96. Item analysis indicated varying levels of e-cigarette dependence, with the PS-ECDI items related to usage frequency averaging a score of 9.42 (Standard Deviation (S.D.)=4.48), translating to 47.1%. The e-FTCD items averaged 4.29 (S.D.=2.23), accounting for 42.9%.

An in-depth analysis of e-cigarette dependence levels, as determined by the e-FTCD scores, revealed that 22.3% of individuals had very low dependence, while 44.6% demonstrated a higher level of dependence. Furthermore, 6.2% exhibited a very high dependence. In comparison, the PS-ECDI scores indicated that 36.3% of the sample had a lower dependence on e-cigarettes, and 30.6% were at the higher end of the dependence spectrum. When examining the SUDST results, it was observed that 48.7% of the participants exhibited few to no symptoms, which was markedly different from the 34.2% who exhibited a range of symptoms that may be considered indicative of a more substantial dependence on e-cigarettes. The divergent patterns of e-cigarette dependence and symptomatology are comprehensively depicted in Table 3, providing a nuanced view of e-cigarette use behavior within the study.

The divergent patterns of e-cigarette dependence and symptomatology are comprehensively depicted in Table 4, providing a nuanced view of e-cigarette use behavior within the study. Specifically, the cross-tabulation in Table 4 reveals significant associations between higher dependence categories—very high dependence and high dependence on the e-FTCD and high to medium dependence on the PS-ECDI—and more severe symptoms on the SUDST, illustrating how different levels of dependence correlate with symptom severity across these measures.

Finally, Spearman's rho analysis confirmed significant correlations between the PS-ECDI and e-FTCD scores and SUDST scores. The PS-ECDI showed a correlation coefficient of 0.714, and the e-FTCD had a coefficient of 0.506. These coefficients suggest a meaningful alignment with the SUDST in measuring e-cigarette dependence among Thai participants. Figure 2 presents an illustrative heatmap of these correlations.

**Table 1** Baseline characteristics of study participants

| Characteristic | Total participants (N=193) |
|---|---|
| Median age (IQR), years | 27 (24,31) |
| Gender, n (%) | |
| Male | 134 (54.5) |
| Female | 59 (45.5) |
| Religion, n (%) | |
| Buddhist | 176 (91.2) |
| Muslim | 12 (6.2) |
| Others/no religion | 5 (2.6) |
| Marital status, n (%) | |
| Single | 153 (79.8) |
| Married | 33 (17.1) |
| Divorced | 6 (3.1) |
| Marital status, n (%) | |
| Single | 153 (79.8) |
| Married | 33 (17.1) |
| Divorced | 6 (3.1) |
| Education level, n (%) | |
| Middle school or less | 77 (39.9) |
| High school | 51 (26.4) |
| Some college | 41 (21.2) |
| Bachelor's degree or higher | 24 (12.4) |
| Occupation, no (%) | |
| Unemployed | 7 (3.6) |
| Student/college | 17 (8.8) |
| Employee/farmer | 97 (50.2) |
| Freelance/self-employed | 60 (31.1) |
| Civil servant | 12 (6.2) |
| Any comorbidities (%) | 7 (3.6) |
| Current use of other Nicotine products, n (%) (can choose more than 1) | |
| None | 63 (32.6) |
| Manufactured cigarettes (conventional) | 110 (57.0) |
| Roll your own smokers (RYO), hand-rolled cigarettes | 54 (28.0) |
| Shisha (Hookah) | 17 (8.8) |
| Pipes and cigars | 5 (2.6) |
| Other substance use | |
| Alcohol | 114 (59) |
| Kratom | 54 (28.0) |
| Cannabis | 20 (10.4) |
| Type of e-cigarette used, n (%) | |
| Disposable | 65 (33.7) |
| Mods/tanks | 45 (23.3) |
| Pods | 83 (43) |

**Table 1** (countinued)

| Characteristic | Total participants (N=193) |
|---|---|
| Age of first using e-cigarette (years) (S.D.) (Min-Max) | 19 (16,21) |
| Mostly time to use e-cigarette, n (%) | |
| 00.01-04.00 | 4 (2.1) |
| 04.01-08.00 | 21 (10.9) |
| 08.01-12.00 | 53 (27.5) |
| 12.01-16.00 | 36 (8.7) |
| 16.01-20.00 | 45 (23.3) |
| 20.01-00.00 | 34 (17.6) |

IQR=interquartile range, S.D.=standard deviation

**Table 2** Questionnaire scores and internal consistency

| Questionnaire | Number of item (total score) | Mean score (S.D.) | Mean of percentage score* | Cronbach's alpha |
|---|---|---|---|---|
| PS-ECDI | 10 (20) | 9.42 (4.48) | 47.1% | 0.87 |
| e-FTCD | 6 (10) | 4.29 (2.23) | 42.9% | 0.57 |
| SUDST | 11 (11) | 4.45 (4.46) | 40.5% | 0.96 |

*mean score/total score*100

PS-ECDI=Penn State electronic cigarette dependence index, e-FTCD=e-cigarette version of the Fagerström test for cigarette dependence, SUDST=substance use disorder screening test, S.D.=standard deviation

**Table 3** Descriptive scores of participant dependence and symptom distribution across questionnaires

| Questionnaire | Category | Score range | % of total score* | Frequency (N=193) | Percent |
|---|---|---|---|---|---|
| e-FTCD | Very low dependence | 0-2 | Up to 20% | 43 | 22.3 |
| | Low dependence | 3-4 | 30-40% | 52 | 26.9 |
| | High dependence | 5-7 | 50-70% | 86 | 44.6 |
| | Very high dependence | 8+ | Over 80% | 12 | 6.2 |
| PS-ECDI | No dependence | 0-3 | Up to 15% | 16 | 8.3 |
| | Low dependence | 4-8 | 20-40% | 70 | 36.3 |
| | Medium dependence | 9-12 | 45-60% | 48 | 24.9 |
| | High dependence | 13+ | Over 65% | 59 | 30.6 |
| SUDST | Few to no symptoms | 0-2 | Up to 18.2% | 94 | 48.7 |
| | Mild symptoms | 3-4 | 27.3-36.4% | 19 | 9.8 |
| | Moderate symptoms | 5-6 | 45.5-54.5% | 14 | 7.3 |
| | Severe symptoms | 7+ | Over 63.6% | 66 | 34.2 |

*The "% of total score" column represents the proportion of the score range relative to the total possible score for each scale (e-FTCD total score=10, PS-ECDI total score=20, SUDST total score=11). These percentages provide insights into the level of e-cigarette dependence or symptom severity as measured by each tool.

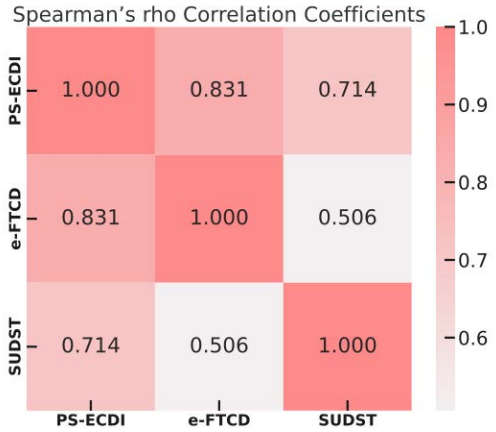
PS-ECDI=Penn State electronic cigarette dependence index, e-FTCD=e-cigarette version of the Fagerström test for cigarette dependence, SUDST=substance use disorder screening test

**Table 4** Comprehensive cross-tabulation of dependence and symptom distribution across questionnaires

| **1. e-FTCD vs. PS-ECDI** | | | | | |
|---|---|---|---|---|---|
| **Category** | **High de-pendence** | **Medium dependence** | **Low depend-ence** | **No dependence** | **Total** |
| Very high dependence | 11 | 1 | 0 | 0 | 12 |
| High dependence | 41 | 32 | 13 | 0 | 86 |
| Low dependence | 7 | 13 | 32 | 0 | 52 |
| Very low dependence | 0 | 2 | 25 | 16 | 43 |
| Total | 59 | 48 | 70 | 16 | 193 |
| **2. e-FTCD vs. SUDST** | | | | | |
| **Category** | **Severe symptoms** | **Moderate symptoms** | **Mild symptoms** | **Few to no symptoms** | **Total** |
| Very high dependence | 10 | 0 | 1 | 1 | 12 |
| High dependence | 45 | 7 | 8 | 26 | 86 |
| Low dependence | 10 | 7 | 4 | 31 | 52 |
| Very low dependence | 1 | 0 | 6 | 36 | 43 |
| Total | 66 | 14 | 19 | 94 | 193 |
| **3. PS-ECDI vs. SUDST** | | | | | |
| **Category** | **Severe symptoms** | **Moderate symptoms** | **Mild symptoms** | **Few to no symptoms** | **Total** |
| High dependence | 45 | 7 | 3 | 4 | 59 |
| Medium dependence | 19 | 5 | 7 | 17 | 48 |
| Low dependence | 2 | 2 | 7 | 59 | 70 |
| No dependence | 0 | 0 | 2 | 14 | 16 |
| Total | 66 | 14 | 19 | 94 | 193 |

*mean score/total score*100

PS-ECDI=Penn State electronic cigarette dependence index, e-FTCD=e-cigarette version of the Fagerström test for cigarette dependence,




PS-ECDI=Penn State electronic cigarette dependence index, e-FTCD=e-cigarette version of the Fagerström test for cigarette dependence, SUDST=substance use disorder screening test

**Figure 2** Heatmap of Spearman's rho correlation coefficients among questionnaire scores.

## Discussion

This study provides a critical evaluation of e-cigarette dependence in Thailand through the cultural and linguistic adaptation of the PS-ECDI and e-FTCD. Validating these tools against SUDST confirms their reliability in this context. Both PS-ECDI and e-FTCD demonstrated positive Spearman's correlations with the SUDST, indicating their validity in measuring e-cigarette dependence. Notably, the PS-ECDI demonstrated a stronger correlation with strong internal consistency with a Cronbach's alpha of 0.87, marking it as a robust measure of dependence. Conversely, despite its lower alpha of 0.57, e-FTCD still holds validity. This juxtaposition underscores the PS-ECDI as a more appropriate tool for assessing reliability in the Thai context. Our findings align with previous research, showing a reliability level of 0.74 for the English version of PS-ECDI and 0.51 for e-FTCD[14], which, alongside the potentially lower reliability observed in the original Fagerström Test for traditional cigarettes[16], highlights the importance of cultural adaptation in different societal contexts.

The analysis of demographic characteristics revealed that e-cigarette users in Thailand are predominantly young adults, with a median age of 27 years. Despite the predominance of young adults in our study, the PS-ECDI and e-FTCD have been designed for broader application across various age groups[10,13–15]. This study establishes a foundation for the tools' reliability and validity in a Thai context. Recognizing demographic specifics, further research is encouraged to explore and validate these tools in other age groups to confirm their effectiveness and applicability across more diverse demographic profiles. The distribution of male and female users is nearly equal, deviating from the typically male-dominated traditional cigarette usage trends[18]. This gender parity in e-cigarette use aligns with international patterns[19] and signals a unique shift within the Thai context, as other local studies report a lower proportion of female users[20,21]. The findings suggest that e-cigarette use cuts across various socio-economic backgrounds, with users engaging in dual consumption of e-cigarettes and other substances, including traditional cigarettes and alcohol, which may indicate a broader culture of poly-substance use rather than e-cigarette use as a smoking cessation aid. E-cigarettes are frequently used alongside traditional rolled cigarettes, rather than as replacements. Additionally, their consumption is commonly paired with that of alcoholic beverages, indicating a trend toward concurrent substance use. Research from various countries has found that people often use e-cigarettes and traditional cigarettes together, along with other substances like alcohol and cannabis[22–24]. This indicates a trend of combined use, highlighting the need for comprehensive strategies in public health to address this complex behavior. In this study, we observed that PODs/vapes, used by 43% of the participants, were notably popular, aligning with global trends and indicating their widespread adoption[25,26]. The design evolution of e-cigarettes may significantly influence this popularity.

Our analysis revealed a broad spectrum of e-cigarette dependence among participants, with nearly half being identified as highly dependent by the e-FTCD tool, and a third similarly being classified by PS-ECDI. This variance between assessment tools underscores the complex nature of dependence, suggesting that the choice of instrument could lead to an overestimation or underestimation of dependence levels. Moreover, a significant challenge in assessing Nicotine dependence arises from the varied methodologies and questionnaires used across studies, which complicates direct comparisons of dependence prevalence. Diverse approaches to measuring Nicotine addiction, influenced by researchers' perspectives and the construction of questionnaires, present a notable challenge[27,28]. The SUDST adds to this complexity by showing a significant divide in the degree

of dependence among users, highlighting the difficulties in accurately assessing and intervening in e-cigarette dependence. These findings have significant public health implications for countries where e-cigarette use is not legally sanctioned. The comparison of mean e-FTCD scores between Thai and Malaysian participants (4.29 vs. 3.9) suggests a slightly higher dependence in the Thai context[10]. It is crucial to consider the differences in study populations, including demographic variations and differing legal restrictions on e-cigarettes, which could influence these outcomes. For instance, Malaysia's more permissive regulatory environment might affect user behavior differently compared to that of Thailand, where strict prohibitions could alter usage patterns and dependence levels. This difference underscores the need for targeted public health strategies in Thailand tailored to specific e-cigarette use patterns and the cultural context. Further comparative studies in this region could inform more effective interventions.

While this study boasts methodological rigor, particularly in its comprehensive adaptation process, it also has several limitations that should be addressed to guide future research. Notably, the sample, being derived from purposive and snowball sampling methods, was not probabilistically representative of all Thai e-cigarette users. This approach, while practical, given the constraints of e-cigarette legality in Thailand, limits the generalizability of the findings to the broader Thai population. Furthermore, the moderate consistency observed in the e-FTCD and potential self-reporting biases highlight the need for data refinement and careful interpretation. Additionally, the overrepresentation of participants from the central and southern regions, accounting for more than 80%, and the underrepresentation of younger individuals, with only 11% under 20 years of age, underline the necessity for more geographically and demographically inclusive research. Expanding the sample to more accurately reflect the diverse demographics of Thailand would enable a fuller understanding of e-cigarette dependence across the entire population.

## Conclusion

This study affirms the effectiveness of the culturally adapted PS-ECDI as a significant instrument for measuring e-cigarette dependence in Thailand, a context in which e-cigarettes face legal constraints. This assessment tool, together with the e-FTCD—which has potential once refined—equips health professionals and policymakers with critical insights for crafting targeted interventions. This study lays the groundwork for future e-cigarette regulation, which should be mindful of cultural sensitivities and public health needs. Future efforts should aim to enhance the reliability of e-FTCD and examine the influence of e-cigarette features on user dependence. Longitudinal studies are recommended to provide a comprehensive view of the long-term effects of e-cigarette use, thus informing policies and public health initiatives.

## Conflict of interest

All authors have no conflict of interest to declare.

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# Appendix

**แบบประเมินภาวะติดสารนิโคตินในบุหรี่ไฟฟ้า Penn State Electronic Cigarette Dependence Index ฉบับแปลไทย โดย นายแพทย์ภูมิใจ สรเสณี และคณะ**

**โปรดเลือกตัวเลือกที่คิดว่าตรงกับการใช้บุหรี่ไฟฟ้าของคุณมากที่สุด**

| คำถาม | คำตอบ | เลือกตอบ | คะแนน* |
|---|---|---|---|
| 1. โดยปกติ คุณใช้บุหรี่ไฟฟ้าวันละกี่ครั้ง? (1 ครั้ง=15 สูบหรือพัฟ หรือ 10 นาที) | 0-4 ครั้งต่อวัน | | 0 |
| | 5-9 ครั้งต่อวัน | | 1 |
| | 10-14 ครั้งต่อวัน | | 2 |
| | 15-19 ครั้งต่อวัน | | 3 |
| | 20-29 ครั้งต่อวัน | | 4 |
| | 30 ครั้งขึ้นไปต่อวัน | | 5 |
| 2. ในวันที่คุณสามารถใช้บุหรี่ไฟฟ้าได้อย่างอิสระ คุณจะเริ่มใช้บุหรี่ไฟฟ้าครั้งแรกหลังจากตื่นนอนกี่นาที? | 0-5 นาที | | 5 |
| | 6-15 นาที | | 4 |
| | 16-30 นาที | | 3 |
| | 31-60 นาที | | 2 |
| | 61-120 นาที | | 1 |
| | 121 นาทีขึ้นไป | | 0 |
| 3. คุณเคยต้องตื่นนอนในตอนกลางคืนเพื่อมาใช้บุหรี่ไฟฟ้าหรือไม่? | ไม่ใช่ | | 0 |
| | ใช่ | | 1 |
| 4. ถ้าตอบ “ใช่” คุณต้องตื่นนอนเพื่อใช้บุหรี่ไฟฟ้ากี่คืนต่อสัปดาห์? (ถ้าข้อ 3 ตอบ "ไม่" ให้ข้ามข้อนี้) | 1 คืน | | 0 |
| | 2-3 คืน | | 1 |
| | 4 คืนขึ้นไป | | 2 |
| 5. คุณยังใช้บุหรี่ไฟฟ้าอยู่เพราะเลิกได้ยาก ใช่หรือไม่? | ไม่ใช่ | | 0 |
| | ใช่ | | 1 |
| 6. คุณเคยมีความรู้สึกอยากใช้บุหรี่ไฟฟ้าอย่างมากใช่หรือไม่? | ไม่ใช่ | | 0 |
| | ใช่ | | 1 |
| 7. ใน 1 สัปดาห์ที่ผ่านมา คุณมีความต้องการใช้บุหรี่ไฟฟ้ามากน้อยเพียงใด? | ไม่มี/มีเล็กน้อย | | 0 |
| | มีปานกลาง/มีมาก | | 1 |
| | มีมากอย่างยิ่ง | | 2 |
| 8. การไม่ใช้บุหรี่ไฟฟ้าในสถานที่ที่ไม่ควรใช้ เป็นเรื่องยากสำหรับคุณ ใช่หรือไม่? | ไม่ใช่ | | 0 |
| | ใช่ | | 1 |
| **เมื่อคุณไม่ได้ใช้บุหรี่ไฟฟ้ามาเป็นระยะหนึ่งแล้ว หรือ เมื่อคุณพยายามหยุดใช้บุหรี่ไฟฟ้า ... (อ่านต่อด้วยประโยคข้อ 9 และ 10)** | | | |
| 9. คุณจะรู้สึกหงุดหงิดมากขึ้นเพราะไม่สามารถใช้บุหรี่ไฟฟ้าได้ ใช่หรือไม่? | ไม่ใช่ | | 0 |
| | ใช่ | | 1 |
| 10. คุณจะรู้สึกประหม่า กระสับกระส่าย หรือวิตกกังวลเพราะไม่สามารถใช้บุหรี่ไฟฟ้าได้ ใช่หรือไม่? | ไม่ใช่ | | 0 |
| | ใช่ | | 1 |
| รวมคะแนน | | | |

*ฉบับที่ให้อาสาสมัครตอบสามารถลบช่องคะแนนได้

## การแปลผลคะแนนรวม (เต็ม 20 คะแนน)

| ระดับภาวะติดสารนิโคตินในบุหรี่ไฟฟ้า | คะแนน |
|---|---|
| ไม่มีภาวะติดสารนิโคติน (No dependence) | 0–3 คะแนน |
| ภาวะติดสารนิโคตินระดับต่ำ (Low dependence) | 4–8 คะแนน |
| ภาวะติดสารนิโคตินระดับกลาง (Medium dependence) | 9–12 คะแนน |
| ภาวะติดสารนิโคตินระดับสูง (High dependence) | 13 คะแนนขึ้นไป |

**อ้างอิงฉบับแปลภาษาไทย** Sornsenee P, Sono S, Buathong N, Sathaporn K, Rodjanasuwan A, Waewsak K, et al. Evaluating E-Cigarette addiction in Thailand: validation of dependence assessment tools for policy and clinical use. J Health Sci Med Res 2025;43:e20251150.

**อ้างอิงต้นฉบับ** Foulds J, Veldheer S, Yingst J, et al. Development of a questionnaire for assessing dependence on electronic cigarettes among a large sample of ex-smoking E-cigarette users. Nicotine Tob Res 2015;17:186–192. doi:10.1093/ntr/ntu204

## แบบประเมินภาวะติดสารนิโคตินในบุหรี่ไฟฟ้า e-cigarette version of the Fagerström Test for Cigarette Dependence ฉบับแปลไทยโดย นายแพทย์ภูมิใจ สรเสณี และคณะ

## โปรดเลือกตัวเลือกที่คิดว่าตรงกับการใช้บุหรี่ไฟฟ้าของคุณมากที่สุด

| คำถาม | คำตอบ | เลือกตอบ | คะแนน* |
|---|---|---|---|
| 1. คุณใช้บุหรี่ไฟฟ้ากี่ครั้งต่อวัน? (1 ครั้ง=15 สูบหรือพัฟ หรือ 10 นาที) | 10 ครั้งหรือน้อยกว่า | | 0 |
| | 11–20 ครั้ง | | 1 |
| | 21–30 ครั้ง | | 2 |
| | 31 ครั้งขึ้นไป | | 3 |
| 2. คุณคิดว่าเป็นเรื่องยากที่จะไม่ใช้บุหรี่ไฟฟ้า แม้ในสถานที่ห้ามใช้ ใช่หรือไม่? (เช่น ห้องสมุด หรือ โรงหนัง) | ใช่ | | 1 |
| | ไม่ใช่ | | 0 |
| 3. ช่วงเวลาใดของวัน ที่คุณรู้สึกว่าเลี่ยงการใช้บุหรี่ได้ยากที่สุด? | ในตอนเช้า | | 1 |
| | อื่น ๆ | | 0 |
| 4. ในวันที่คุณสามารถใช้บุหรี่ไฟฟ้าได้อย่างอิสระ คุณจะเริ่มใช้บุหรี่ไฟฟ้าครั้งแรกหลังจากตื่นนอนกี่นาที? | 0–5 นาที | | 3 |
| | 6–30 นาที | | 2 |
| | 31–60 นาที | | 1 |
| | 61 นาทีขึ้นไป | | 0 |
| 5. คุณใช้บุหรี่ไฟฟ้าใน 2 ชั่วแรกแรกหลังจากตื่นนอนมากกว่าช่วงเวลาอื่นของวัน ใช่หรือไม่? | ใช่ | | 1 |
| | ไม่ใช่ | | 0 |
| 6. คุณยังคงใช้บุหรี่ไฟฟ้าแม้ในขณะป่วยถึงขั้นต้องนอนพักบนเตียง ใช่หรือไม่? | ใช่ | | 1 |
| | ไม่ใช่ | | 0 |
| รวมคะแนน | | | |

*ฉบับที่ให้อาสาสมัครตอบสามารถลบช่องคะแนนได้

## การแปลผลคะแนนรวม (เต็ม 10 คะแนน)

| ระดับภาวะติดสารนิโคตินในบุหรี่ไฟฟ้า | คะแนน |
|---|---|
| ภาวะติดสารนิโคตินระดับต่ำมาก (Very low dependence) | 0–2 คะแนน |
| ภาวะติดสารนิโคตินระดับต่ำ (Low dependence) | 3–4 คะแนน |
| ภาวะติดสารนิโคตินระดับกลาง (Medium dependence) | 5–7 คะแนน |
| ภาวะติดสารนิโคตินระดับสูง (High dependence) | 8 คะแนนขึ้นไป |

**อ้างอิงฉบับแปลภาษาไทย** Sornsenee P, Sono S, Buathong N, Sathaporn K, Rodjanasuwan A, Waewsak K, et al. Evaluating E-Cigarette addiction in Thailand: validation of dependence assessment tools for policy and clinical use. J Health Sci Med Res 2025;43:e20251150.

**อ้างอิงต้นฉบับ** Piper ME, Baker TB, Benowitz NL, Smith SS, Jorenby DE. E-cigarette dependence measures in dual users: reliability and relations with dependence criteria and e-cigarette cessation. Nicotine Tob Res 2020;22:756–63. https://doi.org/10.1093/ntr/ntz040.