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Vaping to Cope? Schema Modes and Vaping Behaviour in an Australian Undergraduate and Community Sample

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Abstract

Objective

Vaping has emerged as a prevalent form of nicotine use, yet limited research has examined the psychological mechanisms that maintain vaping once use is established. Guided by schema therapy models of addiction, this study examined whether individuals who vape differ from non-vapers in schema-mode activation.

Method

Participants were 386 Australian adults recruited from community and student samples. Schema modes were assessed using the Schema Mode Inventory. Vaping status was self-reported. One-way analyses of covariance examined group differences across six schema modes, controlling for psychological distress and general substance-use frequency. Exploratory independent-samples *t*-tests examined whether schema-mode activation differed by psychological dependence severity among individuals who vaped.

Results

Vapers reported significantly higher activation of the Impulsive Child, Compliant Surrenderer, and Detached Self-Soother modes compared with non-vapers. No group differences were observed for Detached Protector, Contented Child, or Healthy Adult modes. Schema-mode activation did not differ between vapers with lower versus higher psychological dependence.

Conclusions

Vaping appears to be associated with heightened impulsive and active avoidant schema modes rather than reduced adaptive functioning. These findings extend schema therapy models of addiction to vaping and identify clinically relevant psychological mechanisms that may inform schema-focused interventions.

Introduction

Addiction remains a major global health concern, contributing to significant social and economic burden (Castaldelli-Maia & Bhugra, 2022; Manthey et al., 2021; Pan et al., 2020). While research has traditionally focused on alcohol, tobacco, and illicit drugs, the past decade has seen a rapid escalation in electronic-cigarette (vaping) use, particularly among adolescents and young adults (Tattan-Birch et al., 2024). In Australia, daily vaping use has increased sevenfold in recent years, rising from 0.5% of adults in 2016 to 3.5% in 2022–2023 (Australian Institute of Health and Welfare, 2024). Use is highest among young adults, with 9.3% of those aged 18–24 vaping daily. In contrast, daily tobacco smoking has continued to

decline to 8.3% over the same period, reflecting a shift in nicotine use toward emerging forms such as vaping.

Although vaping devices were initially promoted as a harm-reduction strategy for established smokers, many users, especially those who have never smoked, engage in problematic, non-therapeutic use characterised by high nicotine exposure, compulsive patterns, and withdrawal symptoms (Simpson et al., 2021; Soule et al., 2020). This pattern has led researchers to conceptualise vaping as a potential behavioural and substance-based addiction, sharing core features of dependence, craving, and impaired control (Dinardo & Rome, 2019; Foulds et al., 2015; Soule et al., 2020). Recent evidence also suggests that vaping is not without harm: a meta-analysis of 119 studies found that non-smoker vapers had nearly double the risk of respiratory symptoms compared with non-users, and that dual users showed elevated risk of chronic obstructive pulmonary disease (Kundu et al., 2025).

To date, much of the vaping literature has focused on prevention and population-level control, including regulatory approaches, public health messaging, and social marketing campaigns aimed at reducing uptake, particularly among young people (Mendelsohn et al., 2023; Stone et al., 2024; Wu et al., 2025). By contrast, substantially less attention has been paid to the psychological mechanisms that maintain vaping once use is established, and there is limited research examining theory-driven psychological models to inform treatment or management. Existing interventions for vaping largely adapt smoking cessation frameworks and prioritise behavioural reduction (Butler et al., 2025; Palmer et al., 2022), with comparatively little emphasis on underlying emotional or cognitive processes that may sustain use. To address this gap, it is necessary to situate vaping within established psychological models of addiction that specify the cognitive, emotional, and motivational processes through which maladaptive behaviours are acquired and maintained. These models provide a theoretical foundation for identifying mechanisms that may also underlie vaping behaviour once use is established.

Theoretical Models of Addiction

Addiction has been conceptualised through multiple theoretical lenses, including cognitive-behavioural, neurobiological, and motivational frameworks. Cognitive-behavioural models emphasise the role of maladaptive beliefs and conditioned learning processes, wherein individuals associate substance use with relief from negative affect or attainment of pleasure (McHugh et al., 2010; Windsor et al., 2015). These beliefs, such as “I need to use to cope” or “I deserve a reward”, become reinforced through repeated pairings of substance use and emotional relief, maintaining dependency cycles even when individuals recognise negative consequences.

Dual-process models propose that addiction arises from an imbalance between two neurocognitive systems: an impulsive, reward-driven system that promotes approach behaviour, and a reflective, self-regulatory system that enables inhibition and long-term goal maintenance (Vandermeeren & Hebbrecht, 2012; Zilverstand & Goldstein, 2020). Under stress or emotional arousal, the impulsive system tends to

dominate, leading to automatic and poorly regulated consumption. This imbalance helps explain why addictive behaviours persist even among individuals motivated to quit.

Complementing these perspectives, the self-medication model (Khantzian, 1997) posits that substances are used to alleviate dysphoric mood states, interpersonal anxiety, or self-critical cognitions. Empirical research consistently links emotional dysregulation to both substance and behavioural addictions, including nicotine, alcohol, and emerging phenomena such as gaming and social-media overuse (Chrétien et al., 2025; Estévez et al., 2017; Giordano et al., 2023). In this view, addiction functions as a maladaptive emotion-regulation strategy: short-term relief reinforces long-term dependence and avoidance of core affective experiences.

Collectively, these models converge on a central premise: that addiction reflects maladaptive attempts to regulate internal states. Dysregulated emotion, impulsive responding, and avoidance of psychological distress form a triad of vulnerability factors that may manifest across diverse forms of addiction, including newer behaviours such as vaping.

Schema Therapy and Addiction Vulnerability

Schema Therapy (Young et al., 2003) provides an integrative framework for understanding addictive behaviours and as a potential treatment approach (Talbot et al., 2024). Early maladaptive schemas, the core construct in this model, represent enduring belief systems formed in childhood when core emotional needs, such as safety, validation, and autonomy, are unmet. A second important clinical construct, schema modes, reflect transient states of emotion, cognition, and behaviour that emerge in response to current stressors (Lobbestael et al., 2007). Four broad mode categories are recognised: child, avoidant, over-compensatory, and parent modes, balanced by the adaptive Healthy Adult mode that regulates them (Bär et al., 2023).

Although there is mounting evidence linking early maladaptive schemas to substance use and addictive behaviours (Sakulsriprasert et al., 2023; Vieira et al., 2023), few studies consider the role of schema modes, even though mode activation may represent a proximal mechanism through which early schemas give rise to addictive behaviour. Indeed, Boog and Tibboel (2023) explicitly conceptualise addictive behaviour as the automatic activation of schema modes—unconscious, difficult to control, efficient, and rapid—rather than as a simple stimulus-response habit. From this perspective, vaping can be understood as an automatic, mode-driven coping response to schema activation, in which individuals find themselves reaching for a vape with little conscious deliberation. This framework helps explain why vaping may persist despite insight, health concerns, or motivation to quit: the behaviour is embedded in highly automatized schema-mode patterns of self-soothing and experiential avoidance. These modes therefore reflect distinct but convergent pathways: impulsive use for reward and avoidant use for relief, both of which reinforce dependence and emotional dysregulation over time.

Although still in its early stages, empirical work has begun to substantiate this theoretical position. Boog et al. (2018) compared alcohol- and cocaine-dependent patients to healthy controls and found that

specific maladaptive modes distinguished individuals with substance use disorders, specifically Detached Self-soother, Detached Protector, Vulnerable Child, Angry Child, Impulsive Child, and Punitive Parent modes. In a later study, Boog et al. (2022) extended this work to borderline personality disorder populations with and without alcohol use disorder, showing that both clinical groups exhibited heightened activation of maladaptive modes (such as the Impulsive Child, Detached Protector, and Detached Self-Soother) relative to nonclinical controls, but did not differ significantly from each other. These findings imply that certain maladaptive modes may cut across diagnostic categories, reflecting transdiagnostic vulnerabilities related to affect regulation and impulsive coping.

Further support for this pattern comes from research in justice-involved and clinical addiction samples. Pilsbury (2022) observed that among incarcerated men with comorbid substance misuse, Vulnerable Child, Impulsive Child, and Detached Protector modes were commonly activated in the context of offence cycles, while over-compensatory modes such as Self-Aggrandizer were less frequent. Similarly, Knapík and Slancová (2020) found that early maladaptive schemas were positively associated with avoidance and over-compensatory coping styles in patients with diverse addictions, reinforcing the conceptual link between schema processes and the defensive strategies underpinning addictive behaviour. Collectively, these studies indicate that maladaptive child and avoidant modes, characterised by impulsivity, emotional distress, and experiential avoidance, may be particularly salient in addiction. The body of research exploring these concepts is still in its infancy, and no study to date has expanded this to the current clinical challenge of vaping.

Schema Modes Relevant to Vaping

Certain schema modes may be particularly relevant to substance use, including vaping behaviour. Child modes, such as the Impulsive Child, reflect emotional reactivity and limited capacity to tolerate frustration (Arntz & Jacob, 2017). For instance, the Impulsive Child acts on desires without forethought, paralleling urges to vape for immediate gratification or affective relief. Avoidant modes, including the Compliant Surrenderer, Detached Protector, and Detached Self-Soother, represent defensive efforts to avoid or suppress painful emotions (Arntz & Jacob, 2017). The Detached Self-Soother relies on numbing or distracting behaviours, which could include as substance use, to regulate discomfort. Similarly, the Compliant Surrenderer may conform to others' expectations or social pressures, aligning with evidence that peer influence and social norms play central roles in vaping initiation (Skinner et al., 2024). Identifying these mechanisms is essential not only for understanding vaping behaviour, but also for informing the development of psychologically grounded approaches to the management of problematic vaping.

The Present Study

Despite increasing recognition of vaping as a behavioural health concern, little is known about the schema-mode correlates of vaping behaviour. Existing research has focused predominantly on static

schema traits, rather than dynamic mode activation, and no study to date has focused on the emerging clinical issue of vaping. The present study addresses this gap by comparing schema-mode profiles of individuals who vape and those who do not. We hypothesised (H1) that individuals who vape would show higher activation of maladaptive child and avoidant modes, specifically the Impulsive Child, Compliant Surrenderer, and Detached Self-Soother, compared with non-vapers. We further hypothesised (H2) that individuals who vape would show lower activation of adaptive modes, namely the Healthy Adult and Contented Child, compared with non-vapers. Last, as an exploratory analysis, we also examined whether schema-mode activation differed as a function of psychological dependence severity among individuals who reported vaping.

Method

Participants and Procedure

A total of 459 Australian adults commenced the survey. Data screening led to the exclusion of 73 cases: three who failed survey validity checks or completed less than 80% of the survey. Most participants (M_{age} = 23.8; *SD* = 14.4) identified as female (76.2%), 20.8% identified as male, and less than 1% identified as transgender man, transgender woman, gender fluid, queer, or another gender identity. Additionally, most participants identified as White or of European descent (69.6%), followed by Asian (12.4%), mixed or multiracial (6.2%), Middle Eastern or North African (5.7%), Hispanic or Latin (1.5%), Pacific Islander (1.3%), Black or of African descent (1.0%), Aboriginal or Torres Strait Islander (0.5%), and other (1.8%). For the vaping group, 31.0% reported vaping 0–4 times per day, 17.9% vaped 5–9 times per day, 22.6% vaped 10–14 times per day, 2.4% vaped 15–19 times per day, 6.0% vaped 20–29 times per day, and 20.2% reported vaping 30 or more times per day on days of use. This group also reported a medium level of psychological dependence on average (Table 1), with 19.1% of vapers falling in the non-dependent range, 32.1% in the low-dependence range, 25.0% in the medium-dependence range, and 28.6% in the high-dependence range (Foulds et al., 2015).

Table 1

Descriptive Statistics for Key Study Variables by Vaping Status

Variable	Vapers (n = 84)		Non-Vapers (n = 302)	
	Mean (SD)	**Range**	**Mean (SD)**	**Range**
PSECDI	9.55 (5.29)	0–20	–	–
K10	27.92 (7.88)	11–50	23.8 (8.36)	10–46
Substance use frequency (ATOP)	13.86 (13.18)	0–56	6.69 (10.00)	0–56
Schema Modes				
Impulsive Child	2.63 (0.65)	1.11–4.00	2.28 (0.67)	1.00–4.89
Compliant Surrenderer	3.03 (0.87)	1.43–4.86	3.06 (0.84)	1.29–5.71
Detached Protector	2.67 (0.93)	1.00–4.78	2.41 (0.84)	1.00–5.22
Detached Self-Soother	3.76 (0.97)	1.75–6.00	3.19 (1.01)	1.00–6.00
Contented Child	3.70 (0.78)	2.20–5.70	3.99 (0.80)	2.00–5.80
Healthy Adult	4.20 (0.68)	2.56–5.78	4.36 (0.70)	2.56–5.89

Note. PSECDI = Penn State Electronic Cigarette Dependence Index; K10 = Kessler Psychological Distress Scale; ATOP = Australian Treatment Outcomes Profile.

Recruitment occurred via Prolific Academic (23.86% of the sample), the Australian Catholic University SONA system (68.02%), and social media platforms (8.12%). Prolific participants were compensated at the platform's standard rate ($6.17 AUD per hour), and SONA participants had the option to complete the survey as part of an undergraduate psychology assignment. All participants provided electronic informed consent and were reminded that participation was voluntary, anonymous, and could be withdrawn at any time without penalty. The study was approved by the Australian Catholic University Human Research Ethics Committee (ID: 2025-4215SAP).

Sample Size Justification

An a priori power analysis was conducted using G*Power 3.1.7 (Faul et al., 2009) for an ANCOVA with two groups and two covariates. Assuming a medium effect size (f = 0.25), an alpha level of .05, and desired power of .80, the required total sample size was 128 participants (64 per group). The current study's sample (N = 386) therefore exceeded this threshold by a substantial margin.

Measures

Demographics and Vaping Behaviour

Participants provided demographic information including age, gender, sexual orientation, English-language status, racial/ethnic background, and recruitment source.

Schema Mode Inventory

The SMI is a 124-item self-report questionnaire designed to assess the activation of 14 schema modes across adaptive and maladaptive coping, child, and parent domains (Lobbestael et al., 2010). Items are rated on a 6-point Likert scale (1 = *never or hardly ever* to 6 = *always*). Subscale scores are calculated as the mean of items within each mode, with higher scores indicating greater activation. An example item is *"I feel like a bad or unworthy person."* The SMI demonstrates excellent internal consistency across clinical and community samples (αs ≈ .79–.96). Internal consistency in the present study ranged from α = .69–.93.

Penn State Electronic Cigarette Dependence Index (PSECDI)

Participants were asked whether they currently used nicotine vapes/e-cigarettes (Yes or No). The PSECDI was administered only to those who reported current use. The PSECDI is a 10-item measure of electronic cigarette dependence, assessing frequency, craving, withdrawal, and loss of control (Foulds et al., 2015). Items employ mixed response formats (categorical, continuous, and Likert-type), producing total scores from 0 to 20, with higher scores reflecting greater dependence (e.g., "Do you ever have strong cravings to use a vape/electronic cigarette?"). Established cut-scores classify users as not dependent (0–3), low dependence (4–8), medium dependence (9–12), and high dependence (13 or greater) (Foulds et al., 2015). For exploratory subgroup analyses, participants who reported vaping were further classified into lower versus higher dependence groups based on established PSECDI cut-scores. Individuals scoring in the not dependent or low dependence ranges (0–8) were grouped as lower dependence, whereas those scoring in the medium or high dependence ranges (9–20) were grouped as higher dependence.

Kessler Psychological Distress Scale (K10)

The K10 assesses general psychological distress over the past 4 weeks using 10 items rated from 1 (*none of the time*) to 5 (*all of the time*) (Kessler et al., 2002). Scores were summed to produce a total distress score, with higher values indicating greater psychological distress. An example item is "In the past 4 weeks, about how often did you feel tired out for no good reason?" The K10 has demonstrated excellent reliability and construct validity (Chan & Fung, 2014; Smout, 2019). Standard interpretive ranges classify scores as low distress (10–15), moderate distress (16–21), high distress (22–29), and very high distress (30–50) (Slade et al., 2011). Internal consistency in this study was α = .81.

The Australian Treatment Outcomes Profile (ATOP)

The ATOP was used to assess the frequency of substance and behavioural use over the past 28 days (Ryan et al., 2014). Participants reported the number of days they had used a range of different substances (e.g., alcohol, cannabis, amphetamine). For the present study, an overall substance-use

frequency score was calculated by summing the total number of days participants reported using any substance, excluding vaping. This composite variable provided an index of general substance-use engagement to control for broader patterns of use. The ATOP has demonstrated strong psychometric properties, including high test–retest reliability (r = .83) and convergent validity (Ryan et al., 2014).

Statistical Analysis

A series of one-way analyses of covariance (ANCOVAs) were conducted to examine whether activation of six schema modes (four maladaptive modes: Impulsive Child, Compliant Surrenderer, Detached Protector, Detached Self-Soother, and two adaptive modes: Contented Child and Healthy Adult) differed between individuals who reported vaping and those who did not. Nicotine vaping status (Yes/No) served as the between-subjects factor.

Two covariates were included in all models. First, psychological distress (K10) was controlled for because distress is strongly associated with maladaptive schema-mode activation (Bär et al., 2023); adjusting for K10 therefore allowed us to isolate the association between vaping status and schema modes independent of general emotional distress. Second, overall substance-use frequency was included to account for the possibility that schema-mode activation reflects broader substance involvement rather than vaping specifically.

For each ANCOVA, assumptions of normality, homogeneity of variance, and homogeneity of regression slopes were evaluated through Shapiro–Wilk tests, Levene's tests, and examinations of interaction terms between vaping status and the covariates. Partial eta-squared (η^2p) was reported as a measure of effect size.

In addition, independent-samples t-tests were conducted within the subgroup of participants who reported vaping to examine whether schema-mode activation differed as a function of psychological dependence severity. Participants were grouped according to low versus high levels of dependence on the Penn State Electronic Cigarette Dependence Index, and schema mode scores were compared across these groups.

Results

Preliminary checks indicated that assumptions of normality, homogeneity of variance, and homogeneity of regression slopes were adequately met across models. Levene's and Bartlett's tests were non-significant in all cases (all ps > .05), indicating equality of error variances. Although some Shapiro-Wilk and Anderson-Darling tests were marginally significant, inspection of residual distributions and the large sample size (N = 386) supported the robustness of the analyses to minor non-normality.

Table 1 presents descriptive statistics for the K10, substance use frequency (ATOP), and schema mode scores among individuals who vape and those who do not. On average, both groups reported moderate levels of psychological distress according to K10 cut-off scores. However, vapers reported notably

higher distress than non-vapers[1]. Further, substance use frequency was also substantially greater among vapers compared with non-vapers[2], indicating broader engagement in substance use behaviours.

Analyses first examined whether Impulsive Child activation differed according to vaping status. A significant effect of vaping emerged, $F(1, 382) = 6.01$, $p = .015$, $\eta^2p = .02$, indicating that individuals who vaped reported higher Impulsive Child scores than non-vapers. For the Compliant Surrenderer mode, vaping status was again a significant predictor, $F(1, 382) = 6.65$, $p = .010$, $\eta^2p = .02$, with vapers reporting higher mode activation.

In contrast, vaping status did not significantly predict Detached Protector activation, $F(1, 382) = 0.11$, $p = .746$, $\eta^2p < .01$. However, a significant effect was observed for the Detached Self-Soother mode, $F(1, 382) = 9.32$, $p = .002$, $\eta^2p = .02$, such that vapers reported higher levels of self-soothing through avoidance-based coping. For the adaptive modes, vaping status did not significantly predict Contented Child activation, $F(1, 382) = 0.08$, $p = .777$, $\eta^2p < .01$, nor Healthy Adult activation, $F(1, 382) = 0.04$, $p = .843$, $\eta^2p < .01$.

Next, independent samples *t*-tests were conducted to examine whether schema-mode activation differed between vapers with lower versus higher psychological dependence (Table 2). No significant group differences were observed for any schema mode.

Table 2
Differences in Schema-Mode Activation by Psychological Dependence Level

Schema Mode	**Low Dependence (n = 45) *M* (SD)**	**High Dependence (n = 39) *M* (SD)**	***t*(82)**	***p***
Impulsive Child	2.69 (0.67)	2.55 (0.62)	-1.03	.308
Compliant Surrenderer	2.98 (0.86)	3.08 (0.89)	0.52	.604
Detached Protector	2.64 (0.83)	2.70 (1.04)	0.31	.754
Detached Self-Soother	3.78 (0.97)	3.74 (0.99)	-0.19	.849
Contented Child (Reversed)	3.70 (0.73)	3.69 (0.84)	-0.03	.975
Healthy Adult (Reversed)	4.16 (0.69)	4.25 (0.68)	0.54	.590

Note. Groups represent low- versus high-psychological-dependence vapers determined by the Penn State Electronic Cigarette Dependence Index (PSECDI).

Discussion

Our study aimed to examine whether individuals who vape differ from non-vapers in the activation of schema modes within an Australian community sample. It was hypothesised that vapers would show

higher activation of maladaptive child and avoidant modes (H1), specifically the Impulsive Child, Compliant Surrenderer, and Detached Self-Soother, and lower activation of adaptive modes (H2), including the Healthy Adult and Contented Child. Partial support was found for our first hypothesis. Individuals who vaped reported significantly greater activation of the Impulsive Child, Compliant Surrenderer, and Detached Self-Soother modes compared with non-vapers. These results remained significant after controlling for both psychological distress and general substance-use frequency, suggesting that the observed differences are not solely attributable to overall distress levels or broader substance involvement. Schema-mode activation did not differ between vapers with lower versus higher levels of psychological dependence. This suggests that the schema-mode patterns identified may reflect vulnerability to engaging in vaping rather than indexing dependence severity once use is established.

The pattern of findings supports the theoretical proposition that vaping may serve as a maladaptive emotion-regulation strategy underpinned by impulsive and avoidant schema modes. Heightened Impulsive Child activation among vapers aligns with the impulsive, reward-driven nature of nicotine use, wherein individuals seek immediate relief or gratification despite awareness of long-term harms. This finding is consistent with Boog et al. (2018), who observed similar impulsivity-linked schema mode activation among alcohol- and cocaine-dependent individuals, and with prior research associating impulsivity and poor self-regulation with substance use and dependence (McHugh et al., 2010; Windsor et al., 2015). Elevated Compliant Surrenderer activation suggests that social conformity and interpersonal pressure may play a role in vaping initiation and maintenance, echoing evidence that peer norms strongly predict vaping uptake among young adults (Skinner et al., 2024). Increased Detached Self-Soother activation indicates that some individuals may rely on vaping as a method of emotional avoidance or self-numbing, aligning with previous literature describing substance use as an avoidant coping strategy (Caricati & Ferrari, 2021; Elam et al., 2023). Similarly, Boog et al. (2018) found that alcohol- and cocaine-dependent individuals demonstrated elevated Detached Self-Soother activation compared with healthy controls, reinforcing the view that maladaptive self-soothing processes underpin both traditional substance use and emerging behaviours such as vaping.

Interestingly, these effects did not extend to all forms of avoidant coping. Activation of the Detached Protector mode did not differ significantly between vapers and non-vapers, diverging from findings reported in clinical substance-use samples, where Detached Protector activation is typically elevated (Boog et al., 2018, 2022). This distinction may reflect meaningful differences in the form of avoidance engaged by this cohort. Whereas the Detached Protector is characterised by passive emotional withdrawal, interpersonal disengagement, and psychological numbing, the Detached Self-Soother represents a more active, behaviourally oriented form of avoidance aimed at regulating distress through self-soothing actions. Our study's findings therefore suggest that vaping in community samples may be more strongly linked to active avoidant coping strategies rather than the rigid emotional suppression and withdrawal commonly observed in more severe or chronic substance use disorders.

Together, most of these findings are consistent with schema therapy models that view addiction as the behavioural expression of maladaptive mode activation (Boog & Tibboel, 2023). They extend prior

studies in clinical populations, such as those involving alcohol or cocaine use (Boog et al., 2018), and comorbid borderline personality disorder with alcohol use disorder (Boog et al., 2022), by demonstrating similar mode patterns of Detached Self-Soother coping in relation to an emerging area of clinical concern – vaping. This suggests that the same underlying schema processes implicated in traditional substance addictions may also contribute to emerging vaping-related behaviours.

Our second hypothesis, that vapers would endorse lower activation of the Contented Child and Healthy Adult modes, was not supported. The absence of group differences for the Contented Child and Healthy Adult modes suggests that vulnerability to vaping may be driven more by excessive activation of maladaptive modes than by deficits in adaptive functioning. This contrasts with Boog et al. (2022), who reported lower Healthy Adult activation among individuals with borderline personality disorder with and without alcohol use disorder compared to controls. However, their analyses did not control for borderline personality disorder symptom severity, raising the possibility that reduced Healthy Adult functioning reflected broader personality pathology rather than substance use per se. Alternatively, the discrepancy may indicate that schema-mode patterns operate differently in clinical versus non-clinical populations, with adaptive modes remaining relatively intact among community vapers.

Clinical Implications

Our findings underscore the clinical relevance of schema therapy for understanding and addressing problematic vaping. Schema therapy targets maladaptive modes such as the Impulsive Child and Detached Self-Soother through interventions that enhance emotional awareness, build distress tolerance, and reduce reliance on avoidance-based coping. Techniques such as imagery rescripting, chair dialogues, and behavioural pattern breaking can help individuals identify vaping urges as mode-driven responses to emotional distress and develop alternative, more adaptive coping strategies. Conceptualising vaping through a schema-mode framework offers clinicians a practical means of addressing both the emotional triggers and the automatic, self-soothing behaviours that maintain vaping behaviour. Incorporating schema-focused interventions into vaping cessation programs may therefore strengthen treatment efficacy by tackling the underlying emotional and cognitive mechanisms that sustain use.

Limitations and Future Directions

Several limitations should be considered. First, the self-report nature of the measures introduces potential response biases, including possible underreporting of vaping behaviour, particularly among student participants (who accounted for 68% of the sample), given that nicotine vapes require a medical prescription in Australia. Second, although the sample was relatively large and diverse, it was predominantly female and White or of European descent, which may limit generalisability to other demographic groups. Third, substance use frequency was included as a covariate; however, this measure reflected the number of days of use rather than quantity or severity, limiting precision in controlling for overall substance involvement. Finally, nicotine vaping frequency was not recorded beyond current use status (yes/no), constraining interpretation of how schema-mode activation may

vary with daily or heavy use. Nonetheless, this limitation is partly mitigated by the finding that the vaping group demonstrated a moderate level of psychological dependence on average according to PSECDI scores (Foulds et al., 2015), suggesting that the sample still represented a clinically relevant cohort of regular vapers. It is also important to note that, although our study was conducted in a community sample, on average participants reported psychological distress levels (K10 scores) within the high distress range (see Table 1), and overall schema-mode endorsement was comparable to levels observed in individuals diagnosed with Axis I DSM-IV disorders in prior research using the SMI (Lobbestael et al., 2010). This suggests that the sample may be best conceptualised as subclinical but psychologically burdened, supporting the relevance of the findings to clinical populations.

Future research should replicate these findings in samples with diagnosed substance use disorders, including nicotine dependence and polysubstance-use populations, to determine whether similar schema-mode patterns emerge across levels of clinical severity. Replication across diverse demographic and cultural contexts will also be important to strengthen external validity. Longitudinal and treatment-focused studies are needed to examine temporal relationships between schema-mode activation and vaping behaviour and to evaluate whether schema-focused interventions can effectively reduce vaping and related addictive behaviours.

Conclusion

In summary, our study provides novel evidence that individuals who vape exhibit higher activation of impulsive and avoidant schema modes compared with non-vapers. These findings extend schema therapy models of addiction to the domain of vaping and suggest that mode-driven emotional and behavioural regulation processes may underlie this emerging public health concern. Schema therapy, with its focus on identifying and restructuring maladaptive modes, may offer a valuable approach for understanding and treating problematic vaping behaviour.

Declarations

Ethical Approval Statement

This study was conducted in accordance with the ethical standards of the Australian National Statement on Ethical Conduct in Human Research. Ethical approval was granted by an Australian University Human Research Ethics Committee (Approval No. 2025-4215SAP). All participants provided informed consent prior to participation and were informed that their participation was voluntary, anonymous, and could be withdrawn at any time without penalty.

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Author Contribution

D.T. conceptualised the study, developed the analytical framework and manuscript structure, and led the interpretation of the findings. A.J.W. conducted data collection and curation and prepared the initial draft of the manuscript. L.H. contributed to study design and provided supervisory support. D.T. and L.H. critically reviewed and revised the manuscript for important intellectual content. All authors contributed to the interpretation of the data and approved the final version of the manuscript.

Data Availability

The data supporting the findings of this study are available via the Open Science Framework at the following anonymised, view-only link:https://osf.io/p58qr/?view_only=df11e3f73b444885800a3299b789f750

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Footnotes

1. $t(384) = 4.03$, $p < .001$
2. $t(388) = 5.41$, $p < .001$