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## ADOLESCENTS' REASONS FOR CONSUMING ENERGY DRINKS: VALIDATION AND FACTOR STRUCTURE OF A NEW SCALE

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**Abstract:** Energy drinks (EnDs) are popular caffeinated beverages, especially among youth. Despite high consumption, links with risky behaviors, and adverse health effects, very few measures exist for examining reasons that drive consumers to continued use. This study aimed to develop and examine the psychometric properties of a new scale for detecting reasons for consuming EnDs. Participants were 184 adolescent energy drink consumers. Exploratory factor analysis showed that the 25 items of the scale were grouped into two components: “Habit and negative affect reduction”, “Pleasure and Stimulation”. The factors had high reliability and satisfactory convergent and divergent validity. This measure could lead to more systematic research on the effects of EnDs consumption.

**Key words:** Caffeinated beverages, Consumption reasons, Energy drinks

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## INTRODUCTION

Popularity of energy drinks (EnD) is increasing, especially among youth (Heckmann, Sherry, Mejia, & Gonzalez 2010; Reissig, Strain, & Griffiths, 2009). Their extensive and frequent use is becoming a public health issue (Pennington, Johnson, Delaney, & Blankenship, 2010), especially among adolescents unaware of their ingredients or possible adverse effects (Attila & Çakir, 2011). Despite popularity, the large and often uncontrolled market, and the concern regarding their extensive usage, research on the reasons for EnD use and psychological functionality is limited (Seifert, Schaechter, Hershorin, & Lipshultz, 2011).

EnDs are marketed for increasing energy levels, with main ingredients being caffeine (a stimulant) and carbohydrates (Bonci, 2002; Malinauskas, Aeby, Overton, Carpenter-Aeby, & Barber-Heidal, 2007). Caffeine content ranges between 80-505mg, three times more than in other soft drinks (Attila & Çakir, 2011; Reid et al., 2014). Other ingredients include taurine, guarana, amino acids, herbal extracts, and sugar. Effects of EnD use include headaches, tachycardia, seizures, poor sleep quality, excessive stress and mood problems, dehydration and digestive problems (Pennington et al., 2010). EnDs have side-effects (e.g., dehydration, tachycardia, stress etc.) which consumers may be unaware of or outweigh the benefits believed to be gained (Seifert et al., 2011).

Younger males, teenagers, Caucasians, and individuals with an active lifestyle (i.e., exercise), are the prevalent consumers of EnDs (Park, Onufrak, Blanck, & Sherry, 2013). This is not surprising as these groups have been mostly targeted by advertisements since they promote EnDs for rebellious, “cool”, and masculine, fun-seeking individuals (Costa, Hayley, & Miller, 2014). Popular reasons for consuming EnDs include: for gaining energy, feeling more alert and awake, replenishing lost energy, better cognitive function, study productivity (Alsunni & Badar, 2011; Attila & Çakir, 2011; Buxton & Hagan, 2012; Reid et al., 2014), enjoying their taste (Bunting, Baggett, & Grigor, 2013; Costa et al., 2014), alluring packaging and advertisements, peer pressure (Alsunni & Badar, 2011; Aluqmany, Mansoor, Saad, Abdullah, & Ahamd, 2013; O’Dea, 2003; Reid et al., 2014), for coping with everyday problems, fatigue, and negative mood and anxiety (Costa et al., 2014; Smit & Rogers, 2002). Thus, EnDs seem to serve similar purposes as other substances such as nicotine in cigarette smoking (Pettit & DeBarr, 2011).

The idea that consuming energy drinks may serve a similar function as other stimulant substances is supported by findings that personality traits, similar to those associated with other drugs, are linked to their consumption (Ianni & Lafreniere, 2014). For example, sensation seeking (search for intense, novel experiences) and

risk-taking (engaging in risky behaviors) are linked to energy drink, cigarette, and alcohol consumption (Azagba, Langill, & Asbridge, 2014; Trapp et al., 2014). Despite associated uplifting purposes, EnDs consumers often experience “jolt and crash” episodes, increased alertness followed by sudden energy level drops, which often result in increased use to feel energized again (Malinauskas et al., 2007). This is not surprising given their high caffeine content (Velasquez, Poulos, Latimer, & Pasch, 2012), which can be addictive and result in behaviors resembling other addictive behaviors. Indeed, the DSM 5 (APA, 2013) lists several caffeine-related disorders under addictive behaviors. Thus, increased use is reinforced via a process of negative reinforcement of aversive sensory experience (cessation of “jolt and crash” and craving) and positive reinforcement of increases in energy level following use. This is a very similar use and maintenance-of-use process, as that seen for other substance use (e.g., smoking, alcohol, drugs). Further, after repeated use, ingestion of EnDs may become less goal-directed and more automatic as seen in smoking (Motschman & Tiffany, 2016).

However, assessment of the reasons for EnD consumption has not been systematic and there are no available standardized measures. Available scales, such as the Energy Drink Use Questionnaire assess quantity/frequency of use, reasons for initiating use, but not motivational reasons leading to continued consumption (Ianni & Lafreniere, 2014). Given that the patterns of use change, from initial reasons for consumption (e.g., as a result of social pressure or so as to appear “cool, masculine”) to later use as a means to prevent negative side-effects and improve energy levels and mood, it is important to examine reasons and maintaining factors of continued consumption (not merely the occurrence of this behavior). The lack of assessment tools examining EnDs reasons for continued use hinders examination into the patterns of use among different groups.

Researchers examining consumption reasons design their own study-specific scales (e.g., Alsunni & Badar, 2011; Aluqmany et al., 2013; Attila & Çakir, 2011; Pettit & DeBarr, 2011; Reid et al., 2014; Trapp et al., 2014), thus, hindering direct comparisons between studies. Ianni and Lafreniere (2014) developed the “Energy Drink Use Questionnaire” based on the Alcohol Use Identification Test (AUDIT; Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998) to examine energy drink use and misuse. They also adapted the Drinking Motives Questionnaire (Cooper, 1994) to form the “Energy Drink Motives Questionnaire”, assessing motives that drive consumption. Finally, the European Food Safety Authority (EFSA) has an online survey assessing frequency, patterns, and reasons of consumption (Zucconi et al., 2013). Nevertheless, none of these measures examines reasons for continued consumption. As already mentioned, a person may start using for one reason (e.g., social pressure), but may continue using for a different reason (e.g., adverse withdrawal symptoms, explained by

instrumental conditioning). Thus, a measure examining reasons for EnDs continuous use could uncover the effects of consumption and resemblance to other substances.

Given the proposed links and frequent concurrent use of EnDs with other substances and overlapping underpinnings of use, one can hypothesize that similar risk-taking or addictive tendencies might underlie these behaviors and similar reasons might drive consumption (Larson, DeWolfe, Story, & Newmark-Sztainer, 2014). For example, both caffeine and nicotine are stimulants possibly serving, for example, a sensation-seeking role (Azagba et al., 2014; Miller, 2008). Indeed, caffeinated beverages increase the reinforcing effects of nicotine and smokers consume more caffeine than non-smokers, probably because of increased caffeine metabolism (Reissig et al., 2009). Considering possible functional similarities between EnDs and cigarette use, a measure examining reasons for continued use could be based on the extensive smoking literature. Therefore, this study aims to modify and adapt the validated “Reasons for Smoking Scale” (RSS; Horn & Waingrow, 1966) into a Reasons for Consuming EnDs Scale (RCEDS). The RSS is a widely used measure examining smoking reasons and motives in six areas: psychosocial, indulgent, sensorimotor, stimulation, addictive and automatic (Tate & Stanton, 1990). Selecting a measure addressing smoking rather than alcohol consumption reasons (e.g., as in Ianni and Lafreniere’s study, 2014) was deemed appropriate, because alcohol is a depressant, not a stimulant like nicotine and caffeine. Although individuals mix EnDs with alcohol (Verster, Aufrecht, & Alfort, 2012), reasons for continuing to use a stimulant may be different from using a depressant (Segal, Cromer, Hobfoll, & Wasserman, 2009). Based on the substance properties (stimulant), and the theories of learning and sensation seeking (Zuckerman, 2008), it was hypothesized that motives for EnDs use, and especially reasons for continuing use, will resemble the reasons for smoking in adolescent populations. For example, EnDs use bears similarities to the six identified areas (stimulation, pleasure, sensorimotor manipulation, negative affect reduction, habit, and psychological addiction) proposed in the reasons for smoking measures (Tate & Stanton, 1990). That is, especially adolescents may initially use stimulant substances such as EnDs to fulfill their sensation-seeking needs (i.e., thrill seeking, immediate gratification and impulsivity) and subsequently use may be maintained by the reinforcing effects of the substance and prevention of (via negative reinforcement) of negative emotions or experiences such as “crash episodes” when the substance is not taken. Thus, this study aimed to adapt the RCEDS, examine its psychometric properties among adolescent energy drink consumers, and examine correlations (convergent validity) with similar assessments (e.g., reasons for consuming from Malinauskas et al., 2007) and constructs that have been associated

to be impacted by ED use, such as sleepiness (measures with the Epworth Sleepiness Scale) and quality of life (assessed using the Youth Quality of Life). Given the impact of high caffeine consumption on sleep, it was hypothesized that the RCEDS would positively correlate with daytime sleepiness. Previous studies suggested a negative impact of EnDs use on quality of life, thus we expected that the RCEDS would negatively correlate with the Youth Quality of Life measure. Divergent validity was assessed using the Weight Concerns Scale, as weight concerns are not motives for consuming energy drinks. This study also aimed to examine the factor structure of the RCEDS. The hypothesis was that the resulting factors would be similar to those reported by the RSS (i.e., in the areas of stimulation, pleasure, sensorimotor manipulation, negative affect reduction, habit, and psychological addiction). Further, smoking studies find gender differences regarding reasons for smoking with females reporting more reasons such as dealing with their negative emotions than males (Simantov, Schoen, & Klein, 2000). This study aimed to explore whether the two genders would differ regarding reasons for using EnDs.

### ***Hypotheses***

The hypotheses of the study were:

- 1) The RCEDS would be reliable (high Cronbach's alpha).
- 2) The RCEDS would exhibit convergent validity with associated constructs, such as positive correlations with sleepiness found to be impacted by the use of EnDs and with the total number of responses on reasons to consume EnDs as measured by the Malinauskas sum score, as well as negative correlations with quality of life found to decrease as a result of excessive EnDs use.
- 3) Additionally, the RCEDS would demonstrate divergent validity by being unrelated to constructs such as weight concerns, given that the idea of using EnDs with their high caloric intake would be incompatible with weight and shape concerns.
- 4) Further, the RCEDS would present with a similar factor structure as the RSS (i.e., in the areas of stimulation, pleasure, sensorimotor manipulation, negative affect reduction, habit, and psychological addiction).
- 5) Finally, it was hypothesized that there would be gender differences regarding reasons for consuming energy drinks, with females presenting more reasons related to dealing with negative emotions compared to males, as seen in the smoking literature.

## METHOD

### *Participants*

Participants were 184 students (Females = 84, 45.7%) energy drink consumers attending 11 middle and 10 high schools. Mean sample age was 15.24 years ( $SD = 1.39$ ; Age range: 13-18 years old). Participants were Greek-Cypriots (87%), Greeks (3.3%), Turkish-Cypriots (0.5%), Maronites (0.5%), and others (8.7%).

Students, whose parents consented (740 contacted and 700 consented), provided informed consent themselves, and 690 of 700 students agreed to participate. From those, 184 (26.67%) indicated regular energy drink consumption (minimum of 5 EnDs per week), completed study questionnaires and were retained for analysis.

### *Measures*

#### *Reasons for Consuming EnDs Scale (RCEDS)*

The RCEDS was adapted from the “Reasons for Smoking Scale” (Horn & Waingrow, 1966) that is comprised of 23 items assessing reasons for continuing to smoke, grouped into six factors: Stimulation, Pleasure, Sensorimotor manipulation, Negative affect reduction, Habit and Psychological addiction (Tate & Stanton, 1990). Given that we hypothesized that reasons for EnD use would resemble those for smoking, the same items of the original smoking scale were used, and their content was changed to reflect EnD use rather than smoking. Example items of RCEDS include: “I consume energy drinks to stimulate and perk me up,” “When I’m trying to solve a problem, I drink an energy drink” (see Appendix 1).

The RCEDS was piloted with 15 young regular energy drink users at the University of Cyprus. These users were asked to comment on their understanding of the scale and propose whether anything should be changed or added to better capture their reasons for EnD consumption. The following changes were then made: Original scale items 4 (“Part of the enjoyment of smoking is watching the smoke as I exhale”) and 5 (“I am very much aware when I am not smoking a cigarette”) were deleted as unrelated to EnD consumption. Items were added based on these EnD users’ comments, the relevant literature and the reasons assumed to underlie EnD continued use. The new items particularly aimed to examine: (a) consumption as means to control weight (i.e., “I consume energy drinks in order to keep my weight at satisfactory levels”); (b) mixing EnDs with other beverages (a reason also reported in previous studies; “I consume energy drinks in combination with other substances such as alcohol or coffee”; Malinauskas et al., 2007) and (c)

two items to reflect social and peer influence (“I consume energy drinks when I go out and have fun” and “I consume energy drinks with friends who also consume them”). The modified scale contains 25 items rated on a Likert-type scale from 1 = “never” to 5 = “always”, see Appendix 1).

#### *Malinauskas’ questions on energy drink use*

Malinauskas et al. (2007) in their study of patterns of energy drink use among college students, used questions to assess reasons for energy drink use with the following response options include: “1” for insufficient sleep, “2” to increase energy levels, “3” for mixing with alcohol while partying, “4” while studying, “5” to treat a hangover, “6” after training, “7” with friends and “8” in other situations. Participants are required to select any of the response options that apply to them. All of the reasons endorsed are added together to yield a total score (0-8) with higher scores indicating more reasons for consuming EnDs. This sum score was chosen to assess convergent validity of the RCEDS, as it fit with the aims of this study, since it assessed conditions under which energy drinks are typically consumed and was created specifically for EnDs and not for other substances (e.g., for alcohol use as in Ianni & Lafreniere, 2014).

#### *The Weight Concerns Scale*

The Weight Concerns Scale (WCS; Killen et al., 1994; Greek validation: Papageorgiou, Zacharia, & Karekla, 2018), evaluates concerns and worry about one’s body and gaining weight, with satisfactory internal consistency reliability (Cronbach’s alpha for both Papageorgiou et al., 2018 and for this study = .78) and stability (test-retest,  $r = .71$ ; Killen et al., 1994). It is a brief unidimensional measure with five items (both in its original and Greek version).

#### *The Epworth Sleepiness Scale-Greek*

The Epworth Sleepiness Scale-Greek (ESS; Tsara, Serasli, Amfilochiou, Constantinidis, & Christaki, 2004) assesses daytime sleepiness. It is a unidimensional scale, with eight items rated on a scale from 0 to 3 (0 = “I never feel like sleeping” to 3 = “I definitely feel like sleeping”). It has good psychometric properties (Cronbach’s alpha = .88; this study, alpha = .76).

#### *The Youth Quality of Life–Short form 2.0*

The Youth Quality of Life–Short form 2.0 (YQOL; Edwards, Huebner, Connell, & Patrick, 2002) assesses multiple domains of quality of life (sense-of-self, social relationships, culture and community, and general quality of life), though it is



scored as a unidimensional measure with higher scores indicating better quality of life. It comprises of 15 items assessed on a Likert-type scale ranging from 0 to 10 (0 = not at all to 10 = very much) and has shown Cronbach's  $\alpha > .80$  (Patrick, 2002). A Greek version of the questionnaire was available from the authors. In a previous study we tested its psychometric properties which appeared similar to the original English version (e.g., unidimensional scale with adequate internal consistency,  $\alpha = .75$ ; Nicolaou & Karekla, 2017). In this study, Cronbach's alpha was .88.

### ***Procedure***

The present study was conducted as part of a larger project aiming to examine eating habits and behaviors among adolescents. The study was approved by the Cyprus National Bioethics Committee, the Pedagogical Institute of Cyprus and the Centre for Educational Research and Evaluation of the Ministry of Education and Culture. The sample was recruited from secondary schools belonging to the European Network of Schools for Health Promotion (ENSHP). This network strives to promote health programs in the education system in order for children to develop healthier lifestyles. All 32 schools in the network were contacted (21 middle schools and 11 high schools) of which 11 middle schools and 10 high schools agreed to participate. School teachers and principals were informed about the study's aims and were provided with consent forms to be signed by parents of adolescents prior to participation. Students, whose parents consented, were asked to provide informed consent themselves. Students who consented to participate were then asked to complete a study questionnaire packet. From the 690 students, 184 (26.67%) indicated that they regularly consume energy drinks and were retained for the purposes of this study.

## **RESULTS**

### ***Descriptives***

All five possible response options for each of the 25 items of the RCEDS were selected by at least some participants, showing good response range (see Table 1). Item means (range: 1.37 - 2.75) and *SDs* (range: 0.79 - 1.32) were consistently low, indicating on average "infrequent endorsement" of the consumption reasons. Item skewness statistics ranged from 0.25 to 2.44. Corrected item-total correlations ranged between .38 and .72, suggesting that all items sufficiently correlated with the total score of the scale. Inter-item correlations ranged from .03 to .75.

**Table 1. Reasons for Consuming Energy Drinks Scale item statistics**

Item	Mean	Standard Deviation	Skewness	Correlations		
				Item to Total	Item to Component 1	Item to Component 2
1	2.40	1.16	.44	.40		.46
2	1.52	.89	1.81	.48	.48	
3	1.51	.93	2.20	.69	.71	
4	1.78	1.04	1.22	.68	.64	
5	1.59	.96	1.81	.62	.66	
6	1.51	.96	1.91	.60	.66	
7	1.60	.95	1.68	.42	.46	
8	1.49	1.01	2.21	.72	.80	
9	1.50	.87	1.84	.66	.69	
10	1.68	1.00	1.67	.47	.46	
11	1.50	.94	2.15	.68	.73	
12	1.63	1.07	1.87	.70	.71	
13	1.37	.79	2.30	.71	.75	
14	2.75	1.21	.40	.39		.53
15	1.47	.92	2.23	.67	.71	
16	1.42	.94	2.35	.69	.75	
17	1.54	1.06	2.13	.46	.48	
18	1.45	.84	2.18	.60	.63	
19	2.30	1.20	.63	.49		.59
20	1.41	.91	2.44	.67	.71	
21	1.43	.80	1.92	.59	.65	
22	2.59	1.32	.25	.44		.60
23	2.04	1.29	.96	.38		.38
24	2.12	1.15	.72	.48		.55
25	2.63	1.24	.28	.42		.51

*Note:* SDs for skewness was .18 for all the 25 scale items; all Cronbach's alphas if-item-deleted were .93 and .74 for components 1 and 2 respectively.

### **Structure and reliability of the RCEDS**

Principal Component Analysis was conducted on the RCEDS items with Oblique rotation (Direct Oblimin) as any resulting components were assumed to be correlated. There was sampling adequacy ( $KMO = .91$ ) and Bartlett's test indicated a not identical correlation matrix. Parallel analysis was conducted using SPSS syntax

(O'Connor, 2000) suggested a two-component solution; Kaiser criterion (eigenvalues > 1) suggested five, and the scree plot two. After examining the range of solutions, the two-component solution was preferable from an interpretation point of view. The two-component solution explained 48.40% of the total variance, 39.10% and 9.30% for the two components respectively (see Table 2).

**Table 2. Principle Components analysis with oblique rotation (Pattern Matrix) of the Reasons for Consuming Energy Drinks Scale**

Items	Component 1: Habit and negative affect reduction	Component 2: Pleasure and stimulation
8	<b>.90</b>	-.12
16	<b>.83</b>	-.07
13	<b>.80</b>	.01
21	<b>.78</b>	-.13
11	<b>.77</b>	.00
20	<b>.77</b>	.00
6	<b>.75</b>	-.10
15	<b>.75</b>	.02
9	<b>.69</b>	.08
12	<b>.69</b>	.13
18	<b>.69</b>	.00
3	<b>.68</b>	.13
5	<b>.67</b>	.04
7	<b>.53</b>	-.05
17	<b>.51</b>	.03
4	<b>.51</b>	.33
2	<b>.47</b>	.10
10	<b>.39</b>	.21
19	.00	<b>.76</b>
22	-.05	<b>.76</b>
14	-.10	<b>.75</b>
25	.00	<b>.66</b>
24	.07	<b>.63</b>
1	.05	<b>.56</b>
23	.13	<b>.42</b>

**Note:** Loadings > .35 are in bold.

Component 1 (18 items) included items depicting reasons where EnDs are consumed because of intense cravings, out of habit, or to counteract negative affect or a negative situation. For this reason, the first component was named “Habit and Negative Affect Reduction”. Component 2 (seven items) represents reasons associated with pleasurable, social, stimulating experiences. It was named “Pleasure and Stimulation.” Item loadings on the respective components were moderate to high (.39 to .90) with no cross-loadings. The two components were moderately intercorrelated,  $r = .44$ . Cronbach’s alpha coefficients showed satisfactory internal consistency: “Habit and Negative Affect Reduction” ( $N = 18$  items)  $\alpha = .94$ , and “Pleasure and Stimulation” ( $N = 7$  items)  $\alpha = .79$ . Correlations of each item to the total score of its respective component were moderate to high and ranged from .46 to .80 for the first component, and from .38 to .60 for the second component.

### ***Gender differences***

When males and females were compared on the mean scores of the items loading each of the two extracted components, the difference on the Habit and Negative Affect Reduction component was significant,  $t(182) = 2.31$ ,  $p = .02$ ,  $d = .34$ , with higher mean component score ( $M = .15$ ,  $SD = 1.09$ ) for males compared to females ( $M = -.18$ ,  $SD = .85$ ). The groups did not significantly differ on the Pleasure and Stimulation factor,  $t(182) = -0.46$ ,  $p = .65$ .

### ***Concurrent validity***

Pearson correlation coefficients were computed between the RCEDS scores and the external measures mentioned in the Methods section to test the predictions about convergent and divergent validity (see Table 3). The correlations show good convergent validity and strong associations between the overall mean RCEDS score and the two components, moderate with the Epworth Sleepiness Scale (ESS) and the Malinauskas’ sum score; negative associations with the YQOL; and no significant relationship with the Weight Concerns Scale (WCS). Both RCEDS components were moderately intercorrelated ( $r = .44$ ) and positively correlated with ESS ( $r = .36$  and  $.27$ ), but only the first component (Habit and Negative Affect Reduction) was negatively related to YQOL ( $r = -.27$ ). The total of the Malinauskas’ items was positively correlated with the second component (Pleasure and Stimulation,  $r = .36$ ), but not the first, probably because the Malinauskas items refer to reasons such as “for increasing energy levels” and “with friends” which are mostly relevant to the second component.

**Table 3. Correlations of RCEDS components with convergent and divergent measures**

	RCEDS Component2	WCS	ESS	YQOL	Malinauskas
RCEDS-Comp1	.44**	.10	.36**	-.27**	.12
RCEDS- Comp2		.14	.27**	-.14	.36**
WCS			.14**	-.22**	.05
ESS				-.11**	.21**
YQOL					.02

**Note:** RCEDS Component1 = Habit and Negative Affect Reduction; RCEDS Component2 = Pleasure and Stimulation; WCS = Weight Concerns Scale; ESS = Epworth Sleepiness Scale; YQOL = Youth Quality of Life; Malinauskas = Total number of responses on the Malinauskas et al. items. \*\*  $p < .01$

## DISCUSSION

The purpose of the present study was to examine the psychometric properties of a new questionnaire, the RCEDS, that assesses the reasons why someone consumes energy drinks. RCEDS was adapted from a widely used questionnaire examining reasons for smoking (Horn & Waingrow, 1966). An association between EnD use and smoking was assumed because both consumed products include stimulating substances, have been associated with risk-taking behavioral patterns in consumers, their use is initiated during adolescence, and reasons between initial use may differ from those of continued use (Trapp et al., 2014). Based on the Sensation Seeking theory (Zuckerman, 2008) and learning theory that associate substance use with the reinforcing effects of substance consumption combined with subsequent use-maintaining negative reinforcement factors (Wood, Cochran, Pfefferbaum, & Arneklev, 1995), we conjectured that motivating reasons for initiating and continuing the consumption will be functionally similar for both substances. For this reason, the proposed Reasons for Consuming Energy Drinks questionnaire was based on a similar measure for smoking, the Reasons for Smoking Scale (RSS; Horn & Waingrow, 1966), which was adapted to correspond to the assessment of reasons for EnDs consumption.

Principal Components analysis on the items of the RCEDS indicated the presence of two components for the new scale instead of five suggested by the original smoking scale. The first component was named Habit and Negative Affect Reduction and included EnDs consumption reasons such as intense cravings, out of habit or to counteract a negative affect or situation. This component integrates three of the factors of the original Smoking Reasons scale (Horn & Waingrow, 1966), in which addictive and habitual consumption and negative affect reduction constituted separate factors. A possible explanation is that whereas nicotine in

cigarette smoking is a highly addictive substance, and as such leads to high levels of addiction in users (Jasinka, Zorick, Brody, & Stein, 2014), EnDs contain high doses of caffeine but probably do not lead to as high an addiction and severe withdrawal symptoms as smoking does. Alternatively, this lack of differentiation of factors for addiction and habit is an artifact due to the population examined. That is, adolescents are at the beginning of their consumption history and have not yet become as addicted to EnDs as older individuals with more years of EnDs consumption are.

The second component, namely, Pleasure and Stimulation, comprised of items describing EnDs consumption for their refreshing, energizing, or resulting pleasurable feeling properties. In the original Reasons for Smoking Scale, there were two distinct factors, for pleasure and stimulation, respectively; however, these factors collapsed into one component in this sample. This may be associated with differences between the two types of products. In EnD consumption pleasurable and stimulating effects may be linked, whereas in cigarette smoking pleasure achieved via the smoking process is emphasized as separate from the stimulating effects of the substance. Future studies should further explore these assumptions with other samples (e.g., adults, more chronic users, etc.).

Embedded in the Pleasure and Stimulation component was the social aspect of EnDs consumption, which was not part of the reasons included in the original smoking scale. We added items relating to the social aspect of consumption following previous research suggesting frequent endorsement of substance use to “fit in” or to deal with social situations (Alsunni & Badar, 2011). Though smoking among youth has also presented with similar findings (i.e., smoking to fit in; Karekla, Symeou, Tsangari, Kapsou, & Constantinou, 2009), it may be the case that these social aspects are more salient for EnD consumers or they were not included in the Reasons for Smoking Scale (Karekla & Papanastasiou, in preparation). Social reasons for use may also be more related to younger age, given that the Reasons for Smoking Scale was developed for adult smokers, it may be the case that the social aspect is more age-specific to youth regardless of whether the substance is cigarettes or EnDs.

The RCEDS showed good convergent validity with measures assessing constructs found to be affected by EnDs use, such as daytime sleepiness and quality of life. Both RCEDS components were positively correlated with the Epworth Sleepiness Scale, suggesting that sleep problems are associated with motivation for energy drink consumption. This finding is in line with literature indicating that unsatisfactory sleep/sleep problems correlate with energy drink consumption (Lohsoonthorn et al., 2013). It is not yet clear from the literature whether it is the consumption that causes sleep problems or vice versa, whether EnDs are consumed

as a coping strategy for sleep problems, or whether it is a bidirectional mechanism that leads to a vicious cycle (i.e., using EnDs to stay awake following sleep deprivation, which then makes sleeping more difficult and leads to more sleep deprivation and energy drink consumption; Roehrs & Roth, 2008). Future studies should investigate in longitudinal type design patterns of energy drink use and their associations to sleep difficulties.

There was also evidence of discriminant validity between the two components: the Malinauskas sum score was positively correlated with the second component (Pleasure and Stimulation), but not the first. Probably because in the Malinauskas' items reasons such as "for increasing energy levels" and "with friends" are relevant to the second component, while none of the items included use for purposes of reducing negative affect.

The Youth Quality of Life score was negatively correlated with the two components of RCEDS, but the association was significant only with the first component. implying that lower life satisfaction and productivity is associated with higher scores on the Habit and Negative Affect Reduction dimension, but not with the Pleasure and Stimulation component. This relation between EnDs use and quality of life, as well as moderating or mediating factors of this relation should be further explored in future investigations as it remains elusive (Ishak, Ugochukwu, Bagot, Khalili, & Zaky, 2012). The RCEDS scale scores did not significantly correlate with the Weight Concerns Scale as expected, suggesting divergent validity of the RCEDS.

Interestingly, mean scores differed between males and females on the Habit and Negative Affect Reduction component, with males scoring higher on this factor. This is an interesting finding, which suggests that males consume EnDs more than females do because of habit or in order to deal with negative emotions. Smoking studies find more females to smoke because of negative emotions rather than males (Simantov et al., 2000), which is the opposite from what was found here. More research is needed on this as it is not clear whether males and females differ in terms of reasons for using different substances.

### ***Implications for future research***

Future longitudinal studies could provide a clearer picture concerning the progression of EnDs consumption and changes in the reasons that lead to starting use compared to reasons maintaining the use. Secondly, the study's adolescent users may not have an extensive history of consumption. Future studies could examine chronic consumers' use reasons and motives. Though no evidence exists that the

structure of the Reasons for Smoking Scale changes in relation to age, there is evidence supporting that as nicotine dependence, addiction, and number of cigarettes smoked increase, certain RSS subscale scores (e.g., the addictive smoking subscale score) increase (Berlin et al., 2003). Also, there is evidence suggesting that reasons for smoking change as individuals age and as addiction increases; thus, one would expect that certain reasons for continued use would become more important (with higher subscale scores) as individuals age (e.g., Sarason et al., 1992). Finally, the English version of RCEDS should also be validated with larger samples and utilizing confirmatory factor analysis, to allow an international use of this measure.

In conclusion, this is the first measure attempting to examine not only reasons for use but also motives for continuing to consume EnDs. The existence of a validated measure of reasons for EnDs consumption could lead in the future to new investigations into potentially related behaviors, including the possible association and similarity between EnD use and that of other substances. The RCEDS could also be used in health-related and clinical interventions research. Finally, RCEDS can be used in research examining possible links, reinforcers, mediators and moderators of reasons for EnD use. Further, in research on EnDs use and its implications for quality of life, sleep, and dietary habits. Clinically, it is important to explore the reasons that youth resort to when consuming such drinks, which can lead to increased awareness and prevention. The existence of measures assessing EnDs consumption could attract further research interest about the consumption of a legal substance, which has been named as an emerging public health issue (Pennington et al., 2010).



## APPENDIX

**Κλίμακα Λόγων Κατανάλωσης Ενεργειακών Ποτών**  
**Reasons for Consuming Energy Drinks Scale (RCEDS)**

*Οι επόμενες ερωτήσεις αναφέρονται στους λόγους που σε ωθούν να καταναλώνεις ενεργειακά ποτά. Κύκλωσε παρακαλώ τι ισχύει για σένα.*  
 [The following questions refer to the reasons for consuming energy drinks. Please circle the answer that best represents you].

	Ποτέ (Never)	Σπάνια (Rarely)	Μερικές φορές (Sometimes)	Συχνά (Often)	Πάντα (Always)
1 Καταναλώνω ενεργειακά ποτά για να με διεγείρουν και να με τονώσουν [I consume energy drinks to stimulate and perk me up]	1	2	3	4	5
2 Έβρισσα τον εαυτό μου να πίνει ενεργειακά ποτά χωρίς να έχω πλήρη συναίσθηση του τι κάνω [I've found an energy drink in my hand and didn't remember putting it there]	1	2	3	4	5
3 Όταν προσπαθώ να επιλύσω ένα πρόβλημα, καταναλώνω ενεργειακό ποτό [When I'm trying to solve a problem, I drink an energy drink]	1	2	3	4	5
4 Μέρος της απόλαυσης του να καταναλώνω ενεργειακά ποτά προέρχεται από τη διαδικασία μέχρι να το ανοίξω και να το καταναλώσω [Part of the enjoyment of consuming energy drinks comes from the process of opening and drinking it]	1	2	3	4	5
5 Όταν νοιώθω μελαγχολία, ή όταν θέλω να διώξω έγνοιες και ανησυχίες απ' το μυαλό μου, καταναλώνω ενεργειακά ποτά [When I feel "blue" or want to take my mind off cares and worries, I drink energy drinks]	1	2	3	4	5
6 Καταναλώνω ενεργειακά ποτά αυτόματα /μηχανικά, χωρίς καν να το συνειδητοποιώ [I consume energy drinks automatically, without even being aware of it]	1	2	3	4	5
7 Καταναλώνω ενεργειακά ποτά για να μην επιβραδύνω τους ρυθμούς μου [I consume energy drinks in order to keep myself from slowing down]	1	2	3	4	5

	Ποτέ (Never)	Σπάνια (Rarely)	Μερικές φορές (Sometimes)	Συχνά (Often)	Πάντα (Always)
8 <i>Με διακατέχει μια έντονη επιθυμία για κατανάλωση ενεργειακών ποτών όταν δεν έχω καταναλώσει για λίγη ώρα</i> [I feel a strong desire to consume energy drinks when I haven't had one for some time]	1	2	3	4	5
9 <i>Όταν νιώθω άβολα ή είμαι αναστατωμένος/η για κάτι, καταναλώνω ένα ενεργειακό ποτό</i> [I usually consume an energy drink when I feel anxious or nervous about something]	1	2	3	4	5
10 <i>Μέρος της απόλαυσης του να καταναλώνω ενεργειακά ποτά είναι και το γεγονός ότι παίζω με το δοχείο</i> [Handling the energy drink container is part of the enjoyment of consuming it]	1	2	3	4	5
11 <i>Στο διάστημα μεταξύ της κατανάλωσης ε.π. με πιάνει μια έντονη επιθυμία που μόνο το ποτό αυτό μπορεί να την ικανοποιήσει</i> [Between energy drinks, I get a craving that only an energy drink can satisfy]	1	2	3	4	5
12 <i>Όταν αισθάνομαι θυμωμένος/η για κάτι, καταναλώνω ε.π.</i> [I consume an energy drink when I feel angry about something]	1	2	3	4	5
13 <i>Καταναλώνω ε.π. χωρίς να συνειδητοποιώ ότι έχω ακόμη ένα ήδη ανοιχτό</i> [I consume energy drinks without realizing that I have already opened another bottle]	1	2	3	4	5
14 <i>Βρίσκω τα ε.π. απολαυστικά</i> [I find energy drinks pleasurable]	1	2	3	4	5
15 <i>Όταν νιώθω ντροπισμένος/η ή αμήχανος/η για κάτι, καταναλώνω ε.π.</i> [When I feel ashamed or embarrassed about something I drink an energy drink]	1	2	3	4	5
16 <i>Όταν μου λείψουν τα ε.π. το βρίσκω αφόρητο μέχρι να μπορέσω να βρω άλλα</i> [When I have run out of energy drinks, I find it almost unbearable until I get them]	1	2	3	4	5
17 <i>Όταν νιώθω αναστατωμένος, λίγα πράγματα με βοηθούν περισσότερο από ότι τα ε.π.</i> [Few things help better than energy drinks when I feel upset]	1	2	3	4	5

	Ποτέ (Never)	Σπάνια (Rarely)	Μερικές φορές (Sometimes)	Συχνά (Often)	Πάντα (Always)
18 Καταναλώνω ε.π. μόνο από συνήθεια, χωρίς καν να θέλω το ποτό [I consume energy drinks just from habit, without even really wanting to drink one]	1	2	3	4	5
19 Η κατανάλωση είναι ευχάριστη και χαλαρωτική [Consuming energy drinks is pleasant and relaxing]	1	2	3	4	5
20 Δεν αισθάνομαι ικανοποιημένη για πολλή ώρα, εκτός αν καταναλώσω ε.π. [I don't feel satisfied unless I consume an energy drink]	1	2	3	4	5
21 Η κατανάλωση ε.π. με βοηθάει να κρατώ το βάρος μου σε ικανοποιητικά επίπεδα [Consuming energy drinks helps me keep my weight on desirable levels]	1	2	3	4	5
22 Καταναλώνω ε.π. όταν βγαίνω έξω και διασκεδάζω [I consume energy drinks when I go out and have fun]	1	2	3	4	5
23 Καταναλώνω ε.π. σε συνδυασμό με άλλες ουσίες (π.χ., αλκοόλ, καφέ) [I consume energy drinks in combination with other substances (ex. alcohol, coffee)]	1	2	3	4	5
24 Καταναλώνω ενεργειακά ποτά για να με «ανεβάσουν/αναζωογονήσουν» [(I consume energy drinks to revitalize/refresh me)]	1	2	3	4	5
25 Καταναλώνω ε.π. όταν είμαι με φίλους που καταναλώνουν και αυτοί [I consume energy drinks when I am with friends who also consume them]	1	2	3	4	5

**Note:** Items appear in both the English and Greek versions. The present study validated the Greek version of the scale.

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