

<b>Supplementary Table 1: Measures assessing short-fills, vaping and smoking status.</b>
<p><i>Awareness of short-fills:</i></p> <p>All respondents were asked, "Have you ever heard of a "shortfill" e-liquid (i.e., a nicotine-free e-liquid that you mix with a separate bottle of nicotine)?"</p> <p>Responses were coded:</p> <ul style="list-style-type: none"> <li>• Yes</li> <li>• Other (No, don't know)</li> </ul> <p>Refusals were excluded</p>
<p><i>Past 30-day short-fill use:</i></p> <p>Youth who vaped in the past 30-days who were aware of short-fills were asked, "In the past 30 days, have you <u>used</u> a "shortfill" e-liquid (i.e., a nicotine-free e-liquid that you mix with a separate bottle of nicotine)?"</p> <p>Responses were coded:</p> <ul style="list-style-type: none"> <li>• Yes</li> <li>• Other (No, don't know)*</li> </ul> <p>Refusals were excluded</p> <p>*In deviation from pre-registered analysis, youth who vaped in the past 30-days who were not aware of short-fills were also coded as 'Other'.</p>
<p><i>Reason(s) for short-fill use:</i></p> <p>Those who had used a short-fill in the past 30 days were asked, "Have you used "shortfill" e-liquids for any of the following reasons? (select all that apply)"</p> <p>Options available:</p> <ul style="list-style-type: none"> <li>• To use nicotine-free e-liquid</li> <li>• To get a higher nicotine concentration (over 20mg/mL)</li> <li>• Less expensive than regular e-liquid</li> <li>• Convenience of a bigger bottle</li> <li>• To get a custom flavour or PG/VG mix</li> <li>• Other</li> <li>• Don't know</li> </ul> <p>Refusals were excluded</p>
<p><i>Vaping status:</i></p> <p>Vaping status was constructed from two questions: "Have you ever tried an e-cigarette/vaped, even one or two puffs?" and "When was the last time you used an e-cigarette/vaped?"</p> <p>Responses were coded:</p> <ul style="list-style-type: none"> <li>• Vaped in past 30-days</li> <li>• Ever vaped (ever tried vaping but not vaped in the past 30 days),</li> <li>• Never vaped</li> </ul> <p>Refusals were excluded</p>
<p><i>Smoking status</i></p> <p>Smoking status was constructed from three questions: "Have you ever tried cigarette smoking, even one or two puffs?", "How many cigarettes have you smoked in your entire life?" and "When was the last time you smoked a cigarette, even one or two puffs?"</p> <p>Responses were coded:</p> <ul style="list-style-type: none"> <li>• Currently smoke (smoked in the past 30 days and smoked 100 or more cigarettes in lifetime)</li> </ul>

<ul style="list-style-type: none"> <li>• Ever smoked (tried smoking but smoked less than 100 cigarettes in lifetime or not smoked in the past 30 days)</li> <li>• Never smoked</li> </ul> <p>Refusals were excluded</p>
Dual use
Smoking and vaping variables were combined from the responses detailed above
<p>Responses were coded:</p> <ul style="list-style-type: none"> <li>• Dual use (currently smoke, and vaped in the past 30 days)</li> <li>• Exclusively vape (vaped in the past 30 days, and ever or never smoked)</li> <li>• Exclusively smoke (currently smoke, and ever or never vaped)</li> <li>• Formally smoked/vaped (ever smoked and vaped, or ever smoked and never vaped, or ever vaped and never smoked)</li> <li>• Never smoked/vaped (never smoked and never vaped)</li> </ul>
<i>Nicotine concentration</i>
<p>Youth who had vaped in the past 30-days were asked, “Do the e-cigarettes, cartridges, pods, or e-liquids you currently use contain nicotine?”.</p> <p>Those who responded ‘No’ were coded ‘0%(0 mg/mL)’.</p> <p>If participants responded ‘Yes’, they were asked “How much nicotine do the e-cigarettes, cartridges, pods, or e-liquids you currently use contain?” with categories as percentages or mg/mL, in 1% (10mg/mL) increments.</p> <p>If they responded ‘2-2.9%(20-29mg/mL)’, a clarification question asked, “You said 2% to 2.9% (20-29mg/mL). Would that be...” with options 2.0% (20mg/mL), or 2.1-2.9% (21-29mg/mL).</p> <p>Responses were coded:</p> <ul style="list-style-type: none"> <li>• 0% (0 mg/mL)</li> <li>• 0.1-1.9% (1-19mg/mL)</li> <li>• 2% (20mg/ml)</li> <li>• 2.1% (21 mg/mL or more)</li> <li>• Don’t Know</li> </ul> <p>Refused’ were removed.</p>

<b>Supplementary table 2: Awareness and use of short-fills by respondent characteristics. ITC Youth Survey, England, 2021, weighted %(n)</b>							
Outcome		A. Aware of short-fills			B. Used a short-fill in the past 30 days		
Sample	Total N=4224	Among all respondents (n=4224)			Among youth who vaped in the past 30- days (n=747)		
	%(n)	%(n)	AOR (95% CI)	p	%(n)	AOR (95% CI)	p
<b>Model 1</b>							
<b>Total</b>		23.0(974)			22.1(150)		
<b>Vaping</b>							
Never vaped	57.5(2429)	18.4(471)	1	Ref	-	-	-
Ever vaped	24.8(1048)	21.8(219)	0.93(0.73-1.18)	.550	-	-	-
Vaped in past 30-days	17.7(747)	41.9(284)	2.14(1.67-2.74)	<.001	22.1(150)	-	-
<b>Smoking</b>							
Never smoked	58.9(2486)	18.1(471)	1	Ref	5.3(6)	1	
Ever smoked	33.9(1433)	27.0(370)	1.30(1.05-1.61)	.015	19.5(83)	4.58(1.60-13.14)	.005
Currently smoke	7.2(305)	50.9(133)	3.13(2.26-4.33)	<.001	43.2(61)	13.7(4.56-40.93)	<.001
<b>Age group</b>							
16-17	43.7(1845)	18.4(391)	1	Ref	21.5(59)	1	
18-19	56.3(2379)	27.6(583)	1.52(1.27-1.80)	<.001	22.6(91)	1.02(0.63-1.65)	.942
<b>Sex</b>							
Male	34.5(1455)	23.6(514)	1	Ref	30.2(100)	1	
Female	65.5(2769)	22.3(460)	0.91(0.77-1.08)	.272	14.5(50)	0.40(0.26-0.62)	<.001
<b>Race/ethnicity</b>							
White	68.0(2873)	23.0(655)	1	Ref	23.6(120)	1	
All other racial/ethnic groups combined	32.0(1351)	23.0(289)	1.12(0.93-1.35)	.231	17.8(30)	0.99(0.58-1.72)	.990
<b>Model 2</b>	Among youth who had vaped in the past 30-days (n=747)			Among youth who had vaped in the past 30-days (n=747)			
<b>Nicotine concentration</b>							
0% (0mg/ml)	40.7(304)	31.8(88)	1	Ref	11.9(33)	1	Ref
0.1%-1.9%(1-19mg/ml)	27.6(206)	54.1(98)	1.68(1.06-2.69)	.029	32.5(59)	2.40(1.32-4.39)	.004
2.0% (20mg/ml)	8.0(60)	45.8(23)	1.41(0.74-2.69)	.294	31.7(15)	2.64(1.14-6.13)	.024
≥2.1% (≥21mg/ml)	11.4(85)	61.7(55)	2.22(1.23-3.99)	.008	40.8(37)	3.16(1.53-6.49)	.002
Don't know	12.3(92)	24.3(24)	0.59(0.31-1.10)	.097	7.4(6)	3.16(1.53-6.49)	.119
<b>Vaping</b>							
Never vaped	-	-	-	-	-	-	-
Ever vaped	-	-	-	-	-	-	-
Vaped in past 30-day	100(747)	41.9(284)	-	-	22.1(150)	-	-
<b>Smoking</b>							
Never smoked	15.1(113)	19.7(22)	1	Ref	5.3(6)	1	Ref
Ever smoked	63.5(474)	40.0(171)	2.63(1.40-4.95)	.003	19.5(83)	3.92(1.32-11.69)	.014
Currently smoke	21.4(160)	64.7(91)	5.97(2.88-12.35)	<.001	43.2(61)	9.16(2.90-29.00)	<.001
<b>Age group</b>							
16-17	32.7(244)	36.7(100)	1	Ref	21.5(59)	1	Ref
18-19	67.3(503)	45.4(183)	1.38(0.93-2.06)	.109	22.6(91)	0.94(0.57-1.56)	.814
<b>Sex</b>							
Male	31.6(236)	53.2(175)	1	Ref	30.2(100)	1	Ref
Female	68.4(511)	31.2(109)	0.40(0.28-0.59)	<.001	14.5(50)	0.43(0.27-0.68)	<.001
<b>Race/ethnicity</b>							
White	72.6(542)	42.6(217)	1	Ref	23.6(120)	1	Ref
All other racial/ethnic groups combined	27.4(205)	39.6(66)	1.15(0.76-1.74)	.515	17.8(30)	0.91(0.53-1.57)	.743
All analyses were weighted							
Model 1 was adjusted for age, sex, race/ethnicity, smoking, vaping							
Model 2 included only youth who had vaped in the past 30-days and was adjusted for age, sex, race/ethnicity, smoking and nicotine concentration.							

**Supplementary table 3: Associations between awareness of short-fills and dual use status. ITC Youth Survey, England, 2021, weighted**

	Aware of short-fills N=4224		
	%(n)	AOR (95% CI)	p
<b>Dual status</b>			
Dual use	64.7(92)	1	Ref
Exclusively vape	35.9(192)	0.31(0.20-0.47)	<.001
Exclusively smoke	34.7(42)	0.29(0.17-0.50)	<.001
Formally smoked/vaped	20.4(265)	0.14(0.09-0.21)	<.001
Never smoked/vaped	17.9(383)	0.13(0.09-0.19)	<.001
Adjusted for age, sex and ethnicity All analysis were weighted			

**Supplementary table 4: Reasons for short-fill use among those who have used short-fills in the past 30 days, ITC Youth Survey, England, 2021, weighted %(n)**

	Use a nicotine free e-liquid	Higher nicotine concentration	Less expensive	Bigger bottle	Custom flavour or PG/VG
	%(n)	%(n)	%(n)	%(n)	%(n)
<b>Total</b>	25.4(38)	27.6(41)	37.6(56)	45.0(67)	34.5(52)
<b>Age group</b>					
16-17 years	26.0(15)	24.8(15)	53.0(31)	49.5(29)	40.8(24)
18-19 years	25.1(23)	28.3(27)	27.8(25)	42.0(38)	30.4(28)
<b>Sex</b>					
Male	20.7(20)	33.2(33)	38.1(38)	48.9(48)	41.4(41)
Female	34.8(18)	16.5(8)	36.7(18)	37.3(19)	20.8(11)
<b>Race/ethnicity</b>					
White	24.1(29)	22.8(27)	37.9(45)	50.1(60)	35.8(43)
All other racial/ethnic groups combined	30.6(9)	46.6(14)	36.4(11)	24.4(7)	29.2(9)
<b>Smoking</b>					
Never smoked	57.4(3)	26.3(20)	16.6(1)	0.0(0)	0.0(0)
Ever smoked	57.4(18)	18.0(1)	36.9(31)	47.8(40)	30.0(25)
Current smoked	27.2(17)	33.2(20)	40.6(25)	45.4(27)	43.8(27)
<b>Usual nicotine concentration</b>					
0% (0mg/ml)	42.3(14)	5.0(2)	43.1(14)	41.0(13)	20.8(7)
0.1%-1.9%(1-19mg/ml)	28.5(17)	27.6(16)	34.3(20)	55.7(33)	37.9(22)
2.0% (20mg/ml)	19.9(5)	34.4(17)	36.6(18)	32.7(16)	39.9(20)
≥2.1% (≥21mg/ml)	27.5(1)	70.6(2)	71.5(3)	42.1(2)	27.5(1)
Don't know	18.4(1)	69.4(4)	28.5(2)	62.0(3)	35.9(2)
All analyses were weighted Participants could provide multiple responses					