VapeX: A Digital Vaping Cessation Intervention for Adolescents with Depression

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INTRODUCTION AND STUDY OBJECTIVE

➤ Nearly half of adolescents who vape nicotine are seriously interested in quitting, yet extant cessation interventions have received little empirical investigation.
➤ An ideal vaping cessation treatment must directly target established vaping risk factors, such as depression, and be highly accessible.
➤ Study Objective: 1) develop a self-directed digital health intervention ("VapeX") incorporating Behavioral Activation (BA) to address depressive symptoms and promote vaping cessation among older adolescents, 2) evaluate intervention feasibility, and 3) describe preliminary efficacy

METHOD

➤ Sample: N=94, 70% Female, Age (M(SD)=18.7(0.9)). Half of participants (N=49) were assigned to use the VapeX app.
➤ VapeX uses BA methods (goal setting, activity scheduling, mood rating) with the aim to reduce depressive symptoms and promote vaping cessation.
➤ Participants were recruited remotely and were eligible if between the ages of 16-20, vaping daily, and currently experiencing elevated symptoms of depression (BDI-II).
➤ Participant data was collected once a week for 4 weeks, evaluating vaping frequency, symptoms of depression, and app usability. App usage was assessed via passively collected app analytics data.
➤ Data were analyzed for app usage, retention across weeks, and usability (SUS) as well as self-reported changes in vaping and depressive scores (BDI-II).

SAMPLE DEMOGRAPHICS & BASELINE VALUES

| Characteristic	Full Sample (N=94)	VapeX (N=49)	Treatment as Usual (N=45)
Sex n(% Female)	66 (70)	32 (65)	34 (76)
Age (M(SD))	18.74 (0.88)	18.76 (0.92)	18.73 (0.84)
Race n(%)			
American Indian/Alaska Native	2 (2)	1 (2)	1 (2)
Asian	1 (1)	0 (0)	1 (2)
Black or African American	8 (9)	4 (8)	4 (9)
White (Caucasian)	75 (80)	38 (78)	37 (82)
Multiracial	6 (6)	4 (8)	2 (4)
Other	2 (2)	2 (4)	0 (0)
Ethnicity n(% Hispanic or Latino)	12 (13)	4 (8)	8 (18)
Highest level of education n(%)			
≤ High School diploma	52 (55)	26 (53)	26 (58)
> High School diploma	42 (45)	23 (47)	19 (42)
Employment status n(%)			
Unemployed	11 (12)	8 (16)	3 (7)
Employed full time	15 (16)	8 (16)	7 (16)
Employed part time	31 (33)	14 (29)	17 (38)
Student	34 (36)	18 (37)	16 (36)
Other	3 (3)	1 (2)	2 (4)
Total family/household income n(%)			
Less than $50,000	40 (43)	22 (45)	18 (40)
$50,000 or more	54 (57)	27 (55)	27 (60)
Type of smartphone n(%)			
iPhone	87 (93)	45 (92)	42 (93)
Android	7 (7)	4 (8)	3 (7)
Vapes per day (M(SD))	19.54 (23.39)	19.22 (25.14)	19.90 (21.60)
Motivation to quit vaping (M(SD))	7.43 (2.25)	7.67 (1.99)	7.22 (2.51)
E-cig dependence (Penn State ECDI) (M(SD))	11.66 (3.13)	11.61 (3.00)	11.71 (3.29)
BDI-II (M(SD))	30.65 (9.21)	30.59 (10.30)	30.71 (7.96)

Sample Demographics and Baseline Values

APP VISUALS
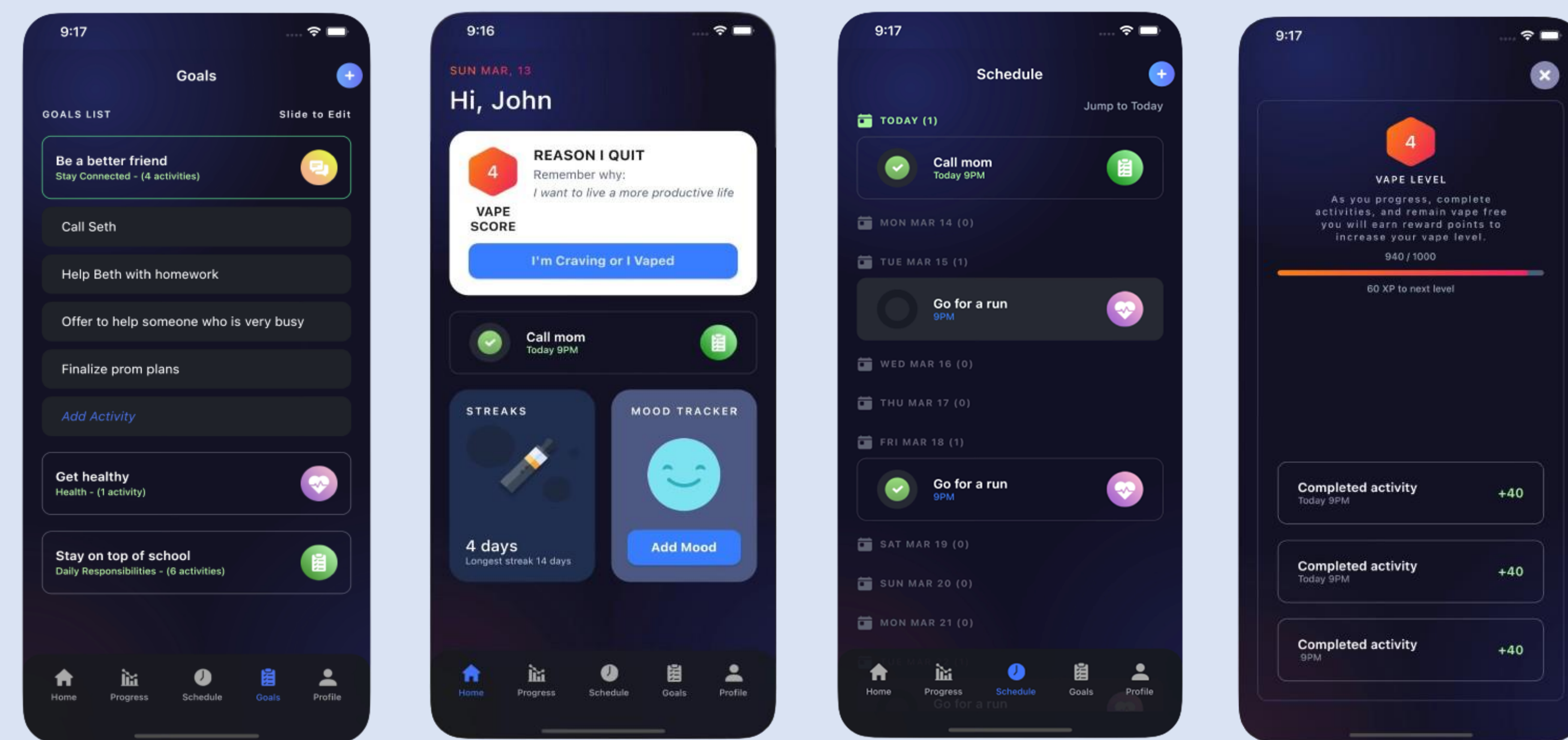
VapeX App Screenshots

APP ENGAGEMENT & USABILITY RESULTS
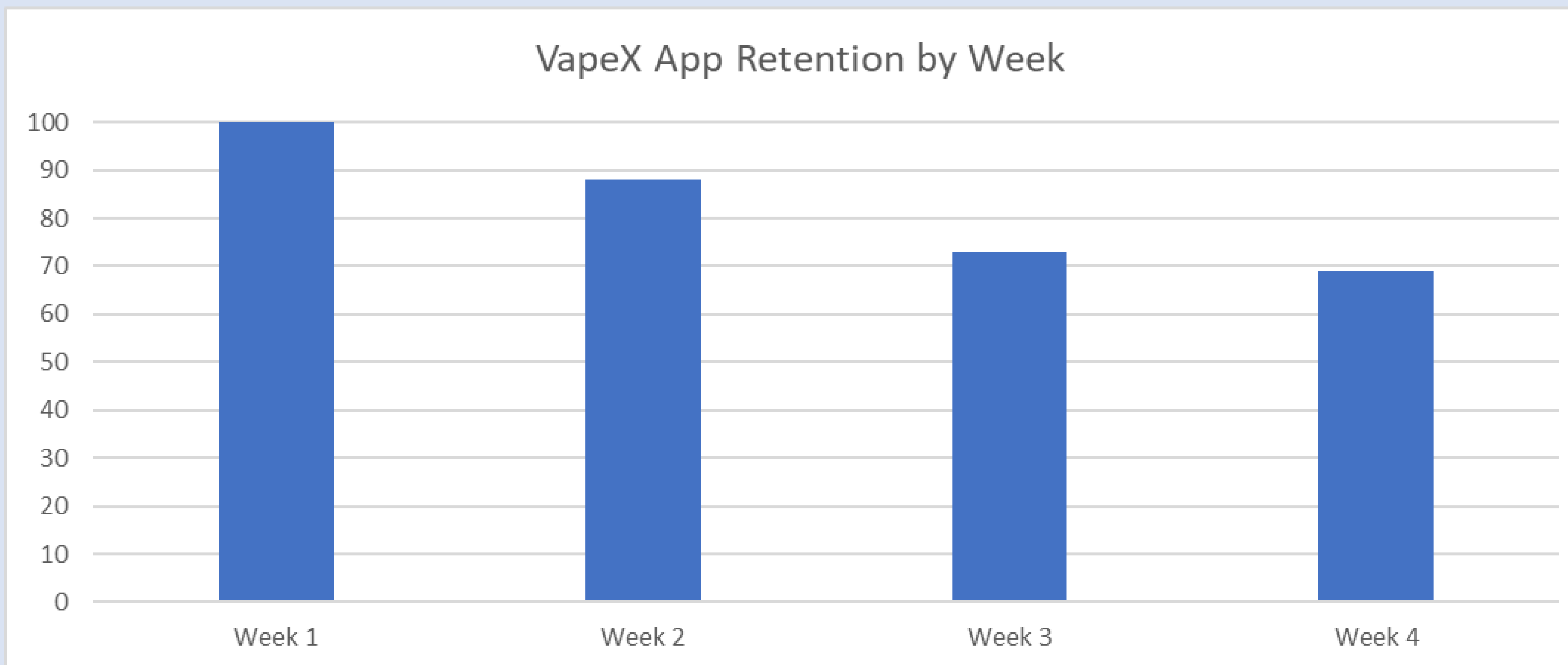
VapeX App Retention by Week

| App Engagement	M(SD)
Total App Sessions	16.8(11.9)
Total Time Using App (mins)	23.9(18.1)
Goals Created	2.0(2.0)
Activities Created	2.8(3.3)
Activities Scheduled	9.2(20.7)
System Usability Scale Score at Week 4	78.7(16.98)

VapeX Overall Engagement

➤ Retention for app use remained high throughout the study duration starting at 100% during Week 1 and finishing at 69% by Week 4.
➤ On average, VapeX users engaged in nearly 17 app sessions across the 4-week period using the app for an average of about 24 minutes total (Table 1).
➤ BA components were used to create an average of 2.0 goals and 2.8 activities. An average of 9.2 activities were scheduled in the app.
➤ Scores on the System Usability Scale (SUS) showed a consistent score of 78-81 throughout the study. At Week 4 the SUS score was 78.7, showing near excellent usability among participants.

MAIN OUTCOMES
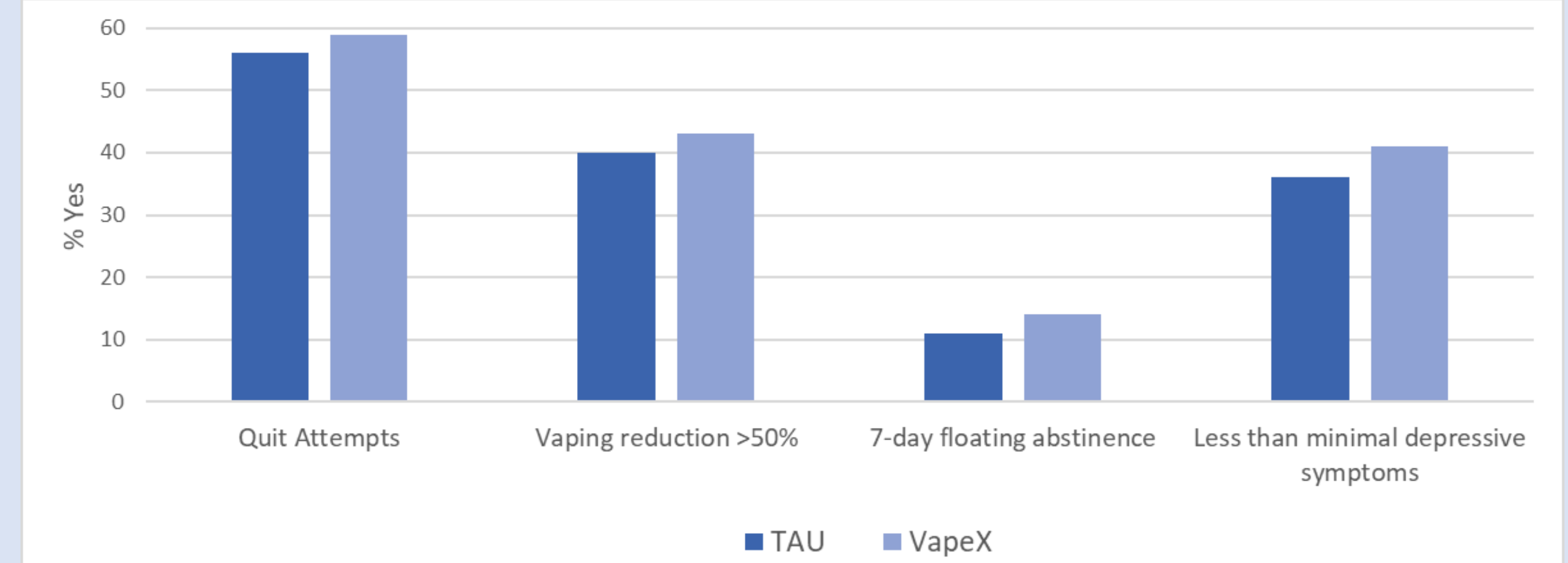
Clinical Outcomes
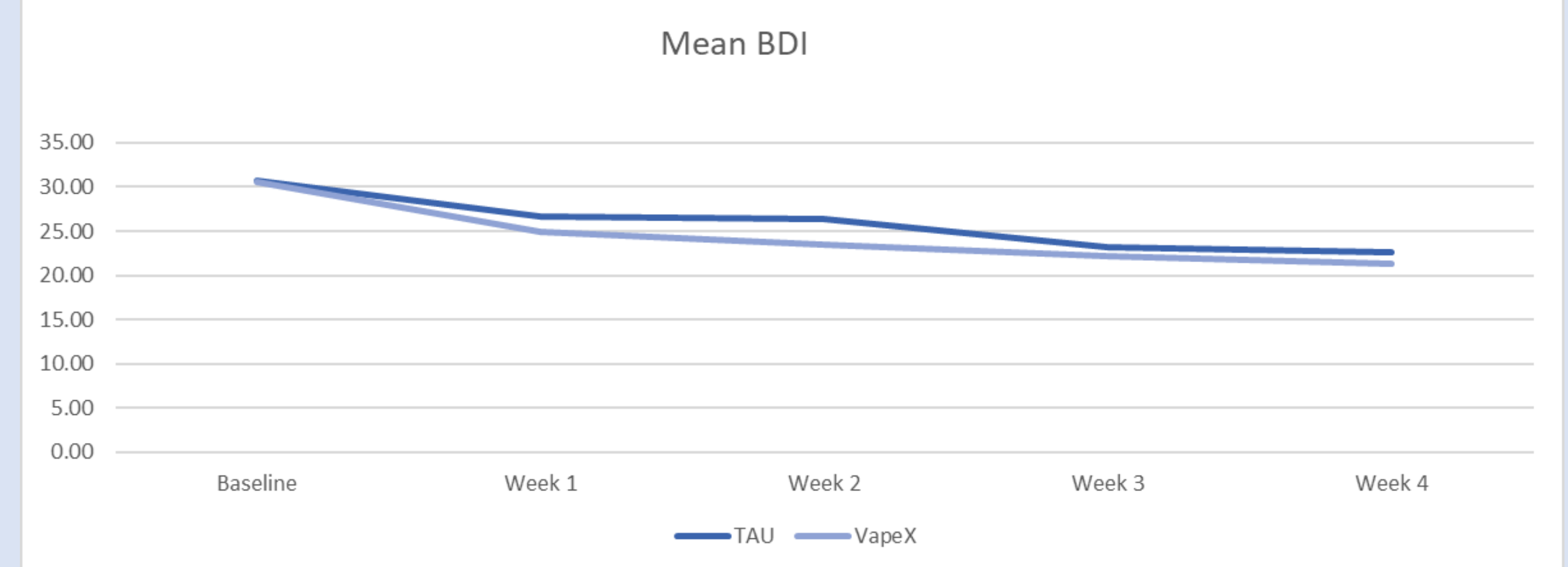
Mean BDI

➤ 59% of VapeX (56% TAU) participants made a vaping quit attempt during trial duration.
➤ 43% of VapeX (40% TAU) participants reduced their vaping by at least 50%.
➤ 14% of VapeX (11% TAU) participants reported complete abstinence for a 7-day period during trial duration.
➤ 41% of VapeX (36% TAU) participants reported less than minimal symptoms of depression during follow-up.
➤ Mean scores of the BDI-II decreased on average 8.67 (9.69) for VapeX group and 8.30 (9.97) for the TAU group.

CONCLUSIONS

➤ Outcomes of this trial were strong from a usability lens. VapeX demonstrated near excellent usability among participants assigned to the app condition.
➤ Retention was strong across all 4-weeks of the study duration showing that users are willing to engage with the intervention.
➤ To bolster efficacy, future app modifications may focus on enhancing engagement with BA components of VapeX, including goal setting, activity scheduling, and activity completion.
➤ While this trial was not powered for efficacy, vaping and depression outcomes numerically (but not statistically) favored the VapeX group. A larger, full-powered study with a refined treatment is warranted.

ACKNOWLEDGEMENTS