Impulsivity Dimensions Predict Treatment Dropout Among Women in Residential Treatment for Substance Use Disorders

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ABSTRACT: Residential treatment for substance use disorders (SUDs) is effective at reducing substance use, dependence, and other related problems. However, dropout from treatment against medical advice (AMA) is common in residential treatment settings. Studies have shown that impulsivity is associated with substance misuse and treatment dropout in predominately male samples, but less is known regarding whether impulsivity dimensions predict treatment dropout among women. This study examined impulsivity dimensions (ie, negative urgency, positive urgency, lack of perseverance, lack of premeditation, and sensation seeking) as predictors of dropout AMA among women in a residential substance use treatment facility (N = 229). Logistic regression results demonstrated that elevations in lack of perseverance and sensation seeking were associated with an increased odds of treatment dropout AMA and that lack of premeditation was associated with a *decreased* odds of treatment dropout AMA. Study findings suggest that early evidence-based interventions for sensation seeking and lack of perseverance may improve retention of women in residential treatment.

KEYWORDS: Treatment retention, residential treatment, interventions, substance misuse, impulsivity

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Completion of residential inpatient treatment for substance use disorders (SUDs) is highly effective at reducing substance misuse and dependence[1] and is associated with long-term benefits, including decreased substance use, fewer relapses, higher employment rates, and lower crime rates.[2] Residential treatment is also related to an increased likelihood of completing treatment relative to outpatient SUD treatment approaches.[3] Still, dropout from residential treatment is common, with rates of dropout ranging from 15% to 57%.[4,5] As such, research into malleable, individual difference factors that increase risk of treatment dropout is greatly needed to improve retention and ultimately promote positive outcomes for patients with SUDs. Impulsivity is commonly investigated as a correlate of SUDs and as a predictor of treatment dropout (eg, Barreno et al.,[6] Moeller et al.,[7] Patkar et al.,[8]). However, many of these studies employed designs with predominately male samples and few have examined subtypes of impulsivity as predictors of treatment dropout among women. This study examined which impulsivity dimensions associated with treatment dropout among women in residential treatment to inform intervention strategies to improve their treatment retention.

Impulsivity dimensions and substance use disorders

Impulsivity is often conceptualized as a personality trait across five dimensions: negative urgency, positive urgency, lack of perseverance, lack of premeditation, and sensation seeking.[9,10] Whiteside and Lynam[10] originally operationalized 4 unique dimensions to assert the multifaceted nature of impulsivity as a personality construct and Cyders et al[9] extended this to five dimensions with the inclusion of positive urgency. Urgency refers to one's disposition to make rash decisions when experiencing intense emotions, with positive urgency corresponding with positive emotions and negative urgency with negative emotions. Individuals with lack of perseverance may have difficulty seeing tasks or commitment through to completion. Lack of premeditation is defined as a failure to plan ahead and carefully consider the consequences of a behavior. Sensation seeking indicates a tendency to engage in novel activities that provoke new and often exciting feelings or sensations and engagement in such activities often involves a degree of risk. Because these personality dimensions are unique, they may differentially associate with negative outcomes, which underscores the need for research to consider impulsivity from a dimensional perspective rather than as a singular construct.

Several studies have examined associations between impulsivity dimensions and substance misuse.[11,12] All forms of impulsivity have been shown to relate to substance misuse[12] and a meta-analysis demonstrated small-to-moderate associations between each impulsivity dimension to alcohol and substance use.[11] However, over and above other impulsivity dimensions, negative urgency is a consistently strong predictor

of substance use and misuse across a variety of samples and types of substances (eg, opioid misuse, alcohol misuse, cannabis misuse, and tobacco misuse[12-14]). As coping and enhancement motives may mediate the relationship between negative urgency and substance use,[15] individuals with elevated negative urgency may be more likely to use substances to cope with distress by countering low mood states. Despite negative urgency being a particularly strong predictor, individuals with SUDs have higher scores on all impulsivity dimensions relative to individuals without SUDs.[16] Therefore, all impulsivity dimensions are a significant concern among patients in residential treatment for SUDs.

Impulsivity dimensions and treatment dropout

Treatment dropout against medical advice (AMA) is particularly concerning, as individuals who drop out of SUD treatment AMA have similar outcomes as individuals who do not receive any treatment for SUDs.[17] Additionally, treatment completion is one of the strongest predictors of long-term positive outcomes.[17,18] Considering that women in treatment for SUDs tend to score higher than men on impulsivity scales,[19] impulsivity may be particularly salient for the retention of women in SUD residential treatment and ultimately their long-term outcomes. Further, elevations in negative urgency and lack of premeditation are related to poor SUD treatment outcomes, which underscores a need for considering impulsivity dimensions in SUDs treatment.[20] Yet, few studies have examined the association between specific impulsivity dimensions and leaving treatment AMA, especially among women.

In addition to conceptualizing impulsivity as a multidimensional personality construct, studies have examined impulsivity in several other ways, including through both unidimensional and multidimensional subjective self-report measures and objective psychological tasks. When measuring impulsivity via psychological tasks (eg, Go/No-Go, Stroop Test, Iowa Gambling Task), impaired decision-making measured by the Iowa Gambling Task was associated with an increased likelihood of treatment dropout in a predominantly male sample.[6] In studies that assessed associations between impulsivity and treatment dropout using self-report measures (eg, Barrett Impulsiveness Scale, UPPS-P Impulsive Behavioral Scale, Monetary Choice Questionnaire), patients with greater novelty/sensation seeking, greater delayed discounting, poorer decision-making, and more difficulties with planning ahead were at greater risk of dropping out of treatment AMA.[6,8,19,21-23] As such, patients who tend to pursue novel experiences that provoke intense emotional sensations, quickly perceive the value of a reward declining with time, and have difficulties reasoning through decisions are more likely to drop out of treatment. These dimensions appear to correspond with the sensation seeking, lack of perseverance, and lack of premeditation dimensions as conceptualized by Whiteside and Lynam[10]. Therefore, when screening for impulsivity among people in residential treatment for SUDs, it may be important to intervene with individuals who have elevations in these personality dimensions. However, no studies examined the effects of these dimensions on treatment dropout risk among specifically women in residential treatment, who may have higher rates of impulsivity than men, and few simultaneously examined these dimensions.

The current study

We examined whether impulsivity dimensions (ie, negative urgency, positive urgency, lack of perseverance, lack of premeditation, sensation seeking) related to treatment dropout AMA among women in residential treatment for SUDs. Consistent with existing studies that examined impulsivity as a predictor of treatment dropout in predominately male samples, we expected that greater sensation seeking, lack of perseverance, and lack of premeditation would be related to increased risk for treatment dropout AMA. We used independent samples t-tests to examine mean differences in impulsivity dimensions between women who dropped out of treatment AMA and women who completed treatment. Next, we tested study hypotheses using hierarchical binomial logistic regression while controlling for alcohol and drug use/problems, age, and intimate relationship status, as prior studies showed that younger people are at greater risk for dropping out of treatment AMA and that intimate relationship status may influence one's willingness to complete treatment because partnered women may have increased pressure to leave (eg, needing to attend to more responsibilities at home) while they are in treatment.[6,24]

Method

Procedure

In this study, we reviewed female patients' medical records at a private, residential substance use treatment center located in the southeastern United States who attended treatment between 2019 and 2022. Data were collected by the residential treatment center after patients completed medical detoxification. Patients were admitted if they were at least 18 years old and received a SUD primary diagnosis after consultation with their treatment team. In general, the patient population at this residential treatment center varied significantly in socioeconomic statuses, education levels, and the method of treatment coverage (eg, private pay, insurance, contracts with employers); however, specifics regarding these factors was not available in medical record data. Patients had a treatment team consisting of a general physician, psychiatrist, licensed social workers, and substance use peer counselors. After a period of detoxification from substances, patients completed a battery of self-report measures and subsequently received treatment based on a traditional 12-Step (abstinence-based) model in addition to individual psychotherapy, family psychotherapy, and group psychotherapy/psychoeducation. Group and individual

psychotherapists used evidence-based strategies, including cognitive behavioral therapy, dialectical behavioral therapy, and schema-focused therapy. Patients who needed trauma-focused therapy also received cognitive processing therapy in group and individual settings. Typically, patients were enrolled at the residential treatment center between 28- and 30-days following detoxification. Prior to enrollment, and after detoxification, patients completed several self-report measures. As part of obtaining informed consent to treatment at the facility, staff informed patients that their medical records may be deidentified and used for research.

Measures

Demographics. We obtained patients' demographics (eg, age, partnered status) from their medical record. We measured a patient's length of stay based on their total number of days in treatment following detoxification.

Treatment completion status. We coded treatment completion for patients as either "AMA" or "completed." Patients who opted to leave treatment before their discharge date against the treatment team's recommendations were coded as AMA and patients who stayed in residential treatment until the recommended discharge date were coded as completed. We also coded patients who were transferred to a different level of care to better meet their needs as completed (n = 8). We excluded any patients from analyses who withdrew from treatment due to administrative reasons (eg, changes in insurance), as they did not meet criteria for either category. In this study, we capped the maximum number days in treatment for those who completed treatment at 30 days to reflect only the days spent in inpatient treatment. Finally, because intensive outpatient or extended care treatment days are not considered part of the general inpatient treatment program, we excluded these days from analyses.

Drug use/problems. We measured drug use/problems with the 14-item Drug Use Disorders Identification Test (DUDIT[25]). This version of the DUDIT was originally created as a screening instrument for drug use and related problems.[25] Since its conception, this measure has been employed in both outpatient and inpatient substance use treatment settings.[26,27] The DUDIT screens for several substances, including cocaine, cannabis, non-prescribed stimulants, hallucinogens, nonprescribed sedatives/anxiolytics/hypnotics, nonprescribed opiates, and other substances (eg, nitrous oxide, steroids). Scores range from 0 to 70 and higher scores indicate more drug use/problems.

Alcohol use/problems. We measured alcohol use/problems using the AlcoholUse Disorders Identification Test (AUDIT[28]) which uses 10 items to measure alcohol use/problems in the past year. The AUDIT assesses the frequency and intensity of drinking as well as symptoms of dependence, tolerance, and other negative consequences within the past year. We summed responses to create a total score that ranged from 0 to 40, with higher scores indicating more alcohol use/problems. The AUDIT has demonstrated adequate internal consistency and reliability in clinical samples.[29]

Impulsivity. The 20-item Short UPPS-P (SUPPS-P[30]) was used to measure impulsivity across five dimensions: negative urgency, lack of perseverance, lack of premeditation, sensation seeking, and positive urgency. Respondents rate each item on a four-point Likert scale (1 = *strongly agree*; 4 = *strongly disagree*). The SUPPS-P has demonstrated strong psychometric properties in several samples and was invariant across age, sex assigned at birth, and socioeconomic status.[31,32] Because medical records contained only scored assessments and not individual responses, we could not calculate Cronbach's alphas for each measure.

Data analytic strategy

We calculated descriptive statistics and conducted multiple logistic regression analyses to test study hypotheses using SPSS Version 27.0. To determine whether impulsivity dimensions predicted treatment dropout over and above each other, we conducted binary logistic regression analyses while statistically controlling for age, partnered status (0 = not partnered; 1 = partnered), and alcohol and drug use/problems. Age, partnered status, AUDIT, and DUDIT were entered in the first step of the model, impulsivity dimensions were entered in the second step, and the dichotomous treatment completion status variable was entered as the outcome variable.

Results

Descriptive statistics

Demographics and characteristics of this sample, including age, race/ethnicity, relationship status, and SUD diagnoses, are presented in Table 1.

Table 2 includes bivariate correlations between study variables and means and standard deviations for each variable. Age negatively correlated with alcohol use/problems, drug use/problems, being partnered, lack of premeditation, and treatment dropout. Alcohol use/problems negatively correlated with drug use/problems. Drug use/problems negatively correlated with lack of perseverance and positively correlated with lack of premeditation and treatment dropout. Being partnered positively correlated with treatment dropout. Negative urgency positively correlated with sensation seeking and positive urgency. Lack of perseverance positively correlated with lack of premeditation, sensation seeking, and treatment dropout. Sensation seeking positively correlated with positive urgency and treatment dropout.

Patients who were partnered were older ($M = 45.41$, $SD = 11.66$) than patients who were not partnered ($M = 38.17$, $SD = 12.96$), $t(227) = -6.16$, $P < .001$, and had less drug use/

Table 1. Sample characteristics.

MEASURES	*M* (SD)	% (N)
Age (years)	41.60 (12.99)	
Length of stay (days)	26.95 (6.48)	
Race		
White		92.14 (211)
Black/African American		3.49 (8)
Multiracial		0.44 (1)
American Indian or Alaska Native		0.44 (1)
Other/Prefer not to answer		3.49 (8)
Ethnicity		
Non-Hispanic or Latina		98.25 (225)
Hispanic or Latina		1.75 (4)
Relationship status[a]		
Married		40.17 (92)
Single		29.26 (67)
Divorced		17.03 (39)
Partnered		5.24 (12)
Separated		4.37 (10)
Widowed		3.93 (9)
Substance use disorder diagnosis[b]		
Alcohol use disorder		79.91 (183)
Opioid use disorder		34.50 (79)
Stimulant use disorder		30.57 (70)
Cannabis use disorder		29.26 (67)
Sedative use disorder		27.51 (63)
Hallucinogen-related disorders		4.80 (11)
Inhalant use disorder		0.87 (2)

N = 229.
[a]Patients who identified as married or partnered were coded as partnered (45.41%) and those who identified as single, divorced, separated, or widowed were coded as not partnered (54.59%).
[b]Patients often had multiple substance use disorders; therefore, percentages for substance use disorder diagnoses add up to more than 100%.

problems ($M = 10.76$, SD = 14.60) than patients who were not partnered ($M = 14.50$, SD = 16.26), $t(226) = 2.01$, $P = .046$. Means of other study variables did not differ between partnered and non-partnered patients. Patients who dropped out AMA were younger ($M = 38.23$, SD = 12.94) than patients who completed treatment ($M = 42.31$, SD = 12.757, $t(227) = 2.84$, $P = .005$. Additionally, patients who dropped out AMA had higher means in lack of perseverance ($M = 8.20$, SD = 2.48), sensation seeking ($M = 10.70$, SD = 2.60), and positive urgency ($M = 10.43$, SD = 3.30) than the mean scores of lack of perseverance ($M = 7.19$, SD = 2.41), sensation seeking ($M = 9.38$, SD = 2.76), and positive urgency ($M = 9.21$, SD = 3.40) among those who completed treatment, *ts*(227) =−2.51 to −2.19, *ps* = 0.004 to 0.03.

Logistic regression

Logistic regression results that simultaneously considered all control variables and impulsivity dimensions are presented in Table 3. Despite the significant bivariate correlations between impulsivity dimensions, tests of assumptions suggested that there were no violations in the collinearity assumption (variance inflation factor [VIF] range = 1.24-2.30; tolerance range = 0.44-0.81). The omnibus model was statistically significant, $\chi^2(9) = 46.57$, $P < .001$, and the overall effect size of the model was small-to-moderate (Cox & Snell $R^2 = .18$; Nagelkerke $R^2 = .29$). Elevations in alcohol use/problems and drug use/problems were associated with an increased odds of dropping out of treatment AMA (OR = 1.04, 95% CI [1.01, 1.08]; OR = 1.06, 95% CI [1.03, 1.10]). Being partnered was also associated with an increased odds of treatment dropout (OR = 4.38, 95% CI [1.87, 10.29]). Additionally, lack of perseverance was associated with an increased odds of treatment dropout AMA (OR = 1.25, 95% CI [1.07, 1.48]). Lack of premeditation was associated with a *decreased* odds of dropping out of treatment AMA (OR = 0.81, 95% CI [0.68, 0.96]). Finally, sensation seeking was associated with an increased odds of dropping out of treatment AMA (OR = 1.25, 95% CI [1.01 1.55]). Age and the remaining impulsivity dimensions were not significantly associated with treatment dropout.

Discussion

These findings highlight the role of impulsivity dimensions in predicting women's dropout from residential treatment for SUDs. Specifically, when accounting for all impulsivity dimensions, lack of perseverance emerged as a significant predictor of treatment dropout. This suggests that women who self-report difficulties following through with commitments at the beginning of treatment are more likely to drop out AMA. Sensation seeking was also related to an increased odds of dropping out of treatment AMA, indicating that women who engage in more risk-taking behavior and have a disposition for pursuing novel activities that provoke excitement may perceive residential treatment as mundane.[21] In turn, women with more sensation seeking may experience more dissatisfaction with this mundanity and, consequently, desire to leave treatment to pursue sensation seeking endeavors with less consideration of the negative implications of dropping out AMA.[23] Overall, these findings are consistent with prior studies among male and mixed gender samples that linked these specific dimensions to treatment

Table 2. Bivariate correlations, means, and standard deviation of study variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Age	-									
2. Alcohol Use/Problems	.19**	-								
3. Drug Use/Problems	–.51**	–.50**	–							
4. Partnered	.26**	–.01	–.11	-						
5. Negative Urgency	–.04	–.01	.06	.06	-					
6. Lack of Perseverance	–.07	–.01	.14*	–.09	.10	-				
7. Lack of Premeditation	–.24**	.05	.27**	–.05	.10	.40**	-			
8. Sensation Seeking	–.05	.03	.03	.06	.57**	.15*	–.03	-		
9. Positive Urgency	–.05	.03	.07	.07	.55**	.13	.03	.71**	-	
10. Treatment Dropout AMA	–.15*	–.02	.25**	.15*	.06	.16*	–.02	.19**	.13	-
M	41.60	18.42	12.87	-	9.58	7.44	8.27	9.71	9.50	-
SD	13.11	12.91	15.64	-	3.03	2.45	2.71	2.68	3.31	-

N = 229. Partnered = in a relationship (eg, married, partnered; not partnered = 0, partnered = 1); AMA = leaving treatment against medical advice (treatment completion = 0; treatment dropout = 1).
**$P < .01$. *$P < .05$.

Table 3. Logistic regression estimates.

VARIABLES	*B*	SE	OR	95% CI	*P*
Age	–0.03	0.02	0.97	0.94, 1.01	.142
Alcohol Use/Problems	0.04	0.02	1.04	1.01, 1.08	.021
Drug Use/Problems	0.06	0.02	1.06	1.03, 1.10	<.001
Partnered	1.48	0.44	4.38	1.87, 10.29	<.001
Negative Urgency	–0.03	0.08	0.97	0.83, 1.13	.683
Lack of Perseverance	0.23	0.08	1.25	1.07, 1.48	.007
Lack of Premeditation	–0.21	0.09	0.81	0.68, 0.96	.013
Sensation Seeking	0.22	0.11	1.25	1.01, 1.55	.043
Positive Urgency	–0.04	0.08	0.96	0.82, 1.13	.621

Abbreviation: OR = odds ratio.
Partnered = in a relationship (eg, married, partnered; not partnered = 0, partnered = 1).

dropout.[6,8,21,23] However, given that this is the first study to test these associations in a female-only sample of patients with SUDs, these impulsivity dimensions may be particularly salient among women.

Unexpectedly, lack of premeditation was associated with a *decreased* odds of dropping out of treatment AMA; however, this association was not supported at the bivariate level. There are several potential explanations for this finding. This finding may reflect a spurious association or suppressor effect that was revealed only when controlling for other impulsivity dimensions. Alternatively, patients with elevated lack of premeditation may frequently threaten to leave treatment and thus receive more support and attention from staff. At this treatment facility, staff intervene with patients who threaten to leave to help them consider the consequences of leaving and identify what they want from treatment. These targeted interventions may address factors associated with lack of premeditation and encourage patients with elevated lack of premeditation to continue in treatment. Further research is needed to determine whether this association replicates in other samples or generalizes.

Clinical implications

Study findings have several important implications for clinical practice. These results support efforts to screen for elevations

across impulsivity dimensions among women when they enter residential treatment. Women who report elevated sensation seeking and lack of perseverance may be identified as higher risk for treatment dropout AMA. In turn, female patients with elevations on these subscales could be linked to early interventions that target these impulsivity dimensions and mechanisms that may mediate the relationship between impulsivity and treatment dropout. Specific strategies for sensation seeking can include behavioral interventions (eg, contingency management, voucher-based reinforcement treatment[21,33]). Specifically, female patients with elevated sensation seeking may benefit from being placed in a more structured environment and receiving tailored interventions that use reinforcement strategies to encourage them to carefully consider decisions and accept mundane circumstances.[33] Female patients with elevated lack of perseverance could benefit from individualized cognitive interventions,[34] including motivational interviewing and cognitive restructuring. Such interventions may help patients develop more motivation to complete treatment and challenge impulsive thoughts that discourage them from treatment completion.

Notably, given the limitations of short-term residential treatment and the dispositional nature of impulsivity,[20] interventions directly targeting impulsivity may not lead to substantial improvement or be useful outside of residential treatment. Therefore, in addition to targeting impulsivity directly, targeting other malleable mediating factors between impulsivity and treatment dropout may also improve treatment retention. For example, female patients with lack of perseverance may have difficulties regulating emotions when experiencing setbacks[35,36] or persevering when treatment gains are not apparent, which may lead them to drop out of treatment due to the lack of immediate gratification. Clinicians could implement interventions that include breaking down tasks and implementing a self-reward system where patients can feel gratification for any treatment gains, no matter their size, which could increase perseverance and motivation to continue in treatment. Patients who present with elevated sensation seeking may also have difficulties coping with stressors and regulating emotions[37,38] and thus emotion regulation skills training could be beneficial. Further, clinicians might identify cognitive distortions in these patients that are related to a need for constant excitement or tolerating boredom.[39] Individualized cognitive restructuring interventions coupled with behavioral interventions for adaptive sensation seeking behaviors (eg, hobbies, exercise) can provide female patients with an outlet for their dispositional sensation seeking tendencies. Further research is needed to determine whether such early individualized interventions can help improve treatment retention for women with elevated sensation seeking and lack of perseverance.

Limitations and future directions

There are several limitations that should be considered when interpreting findings from this study. First, this study was conducted in a primarily White sample located in the southeastern United States; therefore, it is possible that these findings may not generalize to women in residential treatment centers that are in other regions and comprised of patients with more diverse racial/ethnic identities. Women in residential treatment for SUDs also often face unique challenges and responsibilities (eg, childcare) that may impact their ability to remain in treatment[40] which were not considered in this study. Additional studies that consider the contextual realities of women in residential treatment are needed to better understand factors that predict their treatment retention. This residential treatment center also is unique in many ways, including how it is composed of many professionals, offers a variety of evidence-based interventions via group and individual psychotherapy, provides amenities (eg, access to a gym, chronic pain management), spans 30-days, and follows a 12-Step abstinence-based model of substance use treatment. These factors may differ from many other residential treatment centers nationally and ultimately impact generalizability, particularly to residential treatment centers that follow a harm reduction model.

Future studies should replicate these findings in other residential treatment centers for SUDs, particularly those of varying length. It is possible that 30-day residential treatment approaches may be less effective for women with elevated sensation seeking and lack of perseverance and, as such, shorter term or less intensive SUD treatment approaches may be more effective at retention. Further, it may be helpful to test these associations in a sample of male SUD patients and examine gender differences in the associations between impulsivity dimensions and treatment dropout. Additionally, these studies may benefit from multi-method assessments of impulsivity, including objective computerized assessments, and assessment of impulsivity over time to determine whether increases in impulsivity precede treatment dropout. We also did not have data regarding the types of interventions that patients received during their treatment. It is possible that the interventions that some patients received (eg, dialectical behavior therapy skills) may have mitigated the association between impulsivity dimensions and dropping out of treatment AMA; however, we were unable to investigate this in the present study. Although we offer several potential intervention strategies that could improve retention among female SUD patients with these elevated impulsivity dimensions, intervention studies are needed to determine whether screening for impulsivity dimensions and applying these interventions can improve residential SUD treatment retention.

Conclusion

The present study aimed to assess whether impulsivity dimensions predicted dropout AMA from a residential treatment center for SUDs among female patients. Sensation seeking and lack of perseverance were related to an increased odds of dropping out of treatment AMA and lack of premeditation was

related to a decreased odds of dropping out of treatment AMA. Results suggest that, because these specific dimensions of impulsivity may increase risk for dropping out of treatment AMA, screening for impulsivity at the beginning of treatment is imperative for informing early interventions that may improve retention of female patients. Further research is needed to elucidate how impulsivity relates to treatment dropout across substance use treatment settings.

Author Contributions

Evan Basting led the data analysis, interpretation, and writing of the manuscript. Alyssa Medenblik, Kaja Switalska, Alisa Garner, and Drs. Shorey and Stuart provided support in the interpretation of the results and revised the manuscript. All authors approved the manuscript in its current form.

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