

Behavioral Activation for Perinatal Suicide Ideation

Secondary Analysis of a Noninferiority Randomized Clinical Trial

Parisa R. Kaliush, PhD; Nicolette C. Molina, MS; Tara S. Berenbaum, BSc; Cindy-Lee Dennis, PhD; Bradley N. Gaynes, MD, MPH; Samantha Meltzer-Brody, MD, MPH; Mae Lynn Reyes-Rodríguez, PhD; Richard K. Silver, MD; Alison M. Stuebe, MD, MSc; Simone N. Vigod, MD; Crystal E. Schiller, PhD; Daisy R. Singla, PhD

IMPORTANCE Suicide is a leading cause of maternal postpartum death. Evidence-based interventions are needed.

OBJECTIVE To determine whether the likelihood of endorsing suicide ideation (SI) changed during a brief behavioral activation (BA) psychotherapy for perinatal depression irrespective of clinician or delivery types.

DESIGN, SETTING, AND PARTICIPANTS This is a secondary analysis of a multisite, noninferiority, 4-arm randomized clinical trial called SUMMIT (Scaling Up Maternal Mental Health Care by Increasing Access to Treatment). SUMMIT compared clinicians (nonspecialist vs specialist) and modalities (telemedicine vs in person) in delivering BA. Participants were enrolled from January 2020 to October 2023. The study was conducted at university-affiliated networks in Chicago, Illinois; Chapel Hill, North Carolina; and Toronto, Canada. Pregnant (≤ 36 weeks) and postpartum (4-30 weeks) adults with depressive symptoms (Edinburgh Postnatal Depression Scale [EPDS] score ≥ 10) were enrolled. Secondary data analyses were conducted in November 2024.

INTERVENTION A manualized 6- to 8-session perinatal BA intervention delivered weekly.

MAIN OUTCOMES AND MEASURES The primary outcome was SI, as measured by the EPDS item 10, assessed weekly and at 3 months postrandomization. SI endorsements were followed by the Columbia Suicide Severity Rating Scale (C-SSRS) for further safety assessment.

RESULTS A total of 1230 pregnant and postpartum adults were enrolled, among whom 1117 completed 1 or more treatment session and provided 1 or more week of EPDS data and thus were included in the current study. Of 1117 included participants, 264 (23.6%) endorsed SI during treatment, and mean (SD) age was 33.4 (4.9) years. Cumulative link mixed models indicated that the odds of endorsing SI decreased by 25% with each additional treatment session (odds ratio [OR], 0.75; 95% CI, 0.58-0.96; $P = .03$). The odds of endorsing SI decreased by 80% at 3 months postrandomization compared with any time during treatment (OR, 0.20; 95% CI, 0.14-0.27; $P < .001$). The odds of endorsing SI did not differ between clinician type (nonspecialist vs specialist) or modality (telemedicine vs in person). Goodness-of-fit χ^2 tests further indicated that participants were significantly more likely to endorse suicide thoughts on the C-SSRS at treatment onset compared with any other time point.

CONCLUSIONS AND RELEVANCE In this secondary analysis of the SUMMIT noninferiority randomized clinical trial, the likelihood of endorsing SI decreased over the course of a brief BA psychotherapy for perinatal depression and most significantly at 3 months postrandomization, irrespective of clinician or delivery types. BA may be one evidence-based, scalable approach for perinatal suicide prevention.

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Author Affiliations: Author affiliations are listed at the end of this article.

Corresponding Author:
Daisy R. Singla, PhD, Centre for Addiction and Mental Health, 60 White Squirrel Way, Room 313, Toronto, ON M6J 1H4, Canada (daisy.singla@utoronto.ca).

Behavioral activation (BA) is a first-line recommended treatment for perinatal depression¹ and may reduce postpartum suicide risk by increasing values-consistent living and awareness of ineffective behaviors.² BA can be implemented via telemedicine³ and nonspecialists,⁴ which has the potential to increase access to psychotherapy. However, the effects of BA on perinatal suicide ideation (SI) have not been studied. We conducted a secondary analysis of the SUMMIT (Scaling Up Maternal Mental Health Care by Increasing access to Treatment) randomized clinical trial. In SUMMIT, BA delivered by nonspecialists and telemedicine was noninferior to specialist, in-person care.⁵ In the current study, we assessed whether the likelihood of endorsing SI changed throughout treatment and at 3 months postrandomization and whether these changes varied by clinician or delivery type.

Methods

Participants

Adult English- and Spanish-speaking pregnant (≤ 36 weeks' gestation) and postpartum (4-30 weeks) participants provided written informed consent and were eligible if they scored 10 or higher on the Edinburgh Postnatal Depression Scale (EPDS).⁶ For the current study, we included all participants ($N = 1117$) who received 1 or more treatment session and provided 1 or more week of EPDS data. See eTable 1 in Supplement 1 for enrollment and procedural information.

Procedures

SUMMIT was a multisite, noninferiority randomized clinical trial conducted in North America (Chapel Hill, North Carolina; Chicago, Illinois; and Toronto, Ontario, Canada) testing the comparable effects of specialists vs nonspecialists and in-person vs telemedicine delivery of BA to treat perinatal depression.⁷ The study was approved by the institutional ethics board at each site. This study followed Consolidated Standards of Reporting Trials (CONSORT) reporting guidelines, and the CONSORT diagram and checklist pertaining to this secondary study can be found in eFigure 3 and eTable 4 in Supplement 1, respectively. The primary trial protocol, statistical analysis plan, and primary results have been published elsewhere.^{5,7} Participants were blinded to randomization into 1 of the following 4 intervention arms: (1) in-person specialist, (2) in-person nonspecialist, (3) telemedicine specialist, and (4) telemedicine nonspecialist. Data were collected through REDCap surveys.

Intervention

The intervention comprised 6 to 8 weekly individual sessions.⁵ Specialists included psychologists, psychiatrists, and social workers with 5 or more years of experience delivering psychological treatments. Nonspecialists included registered nurses, midwives, and doulas with no formal background or training in mental health care.

Outcomes

EPDS item 10 ("In the past 7 days, the thought of harming myself has occurred to me") was the primary indicator of SI in the

Key Points

Question Can a brief behavioral activation psychotherapy reduce the likelihood of endorsing suicide ideation (SI) among perinatal populations, and do effects differ based on clinician type (nonspecialist vs specialist) or modality (telemedicine vs in person)?

Findings In this secondary analysis of a multisite noninferiority randomized clinical trial evaluating behavioral activation for perinatal depression among 1117 patients, the likelihood of endorsing SI decreased by 25% with each additional treatment session and by 80% at 3 months postrandomization, irrespective of clinician type or modality.

Meaning Behavioral activation delivered by various health care clinicians and modalities may be an effective and scalable intervention for perinatal SI.

current study, as has been done in prior clinical trials⁸ (see eFigure 1 in Supplement 1 for more EPDS item 10 details). When SI was detected (score of ≥ 1), clinicians administered the Columbia Suicide Severity Rating Scale (C-SSRS).⁹ Participants responded yes or no to questions assessing SI, intent, and plan, which are outlined in eTable 2 in Supplement 1. We examined C-SSRS responses secondarily to validate EPDS results, given that self-harm thoughts may not always reflect SI.¹⁰ EPDS and C-SSRS were examined session-wise and at 3 months postrandomization. We assessed demographic characteristics and PTSD Checklist¹¹ scores at baseline to characterize our sample.

Statistical Analysis

All analyses were conducted in R version 4.4.1 (R Foundation). We used the *mice* package to handle missing data (see eTable 3 in Supplement 1) and generated 5 imputed datasets.¹² For descriptive analyses, we used the *parameters* package for *t* tests and χ^2 tests comparing demographic and clinical characteristics of those with and without SI at some point during treatment.

For primary analyses, we analyzed EPDS item 10 in its ordinal format and ran 4 cumulative link mixed models with random intercepts, which accounted for variable EPDS values at treatment onset. We used the "clmm" function from the *ordinal* package to model change in the odds of endorsing SI across treatment sessions. Model 1 tested sequential weekly treatment sessions as the predictor. The subsequent 3 models tested whether changes in the odds of endorsing SI differed based on clinician type, modality, or the 4-arm randomization. We ran a logistic regression model using the *stats* package to evaluate whether the odds of endorsing SI changed at 3 months postrandomization compared with any time during treatment. Finally, we conducted χ^2 goodness-of-fit tests to assess if the number of C-SSRS endorsements differed significantly over time.

Results

Descriptive Analyses

Of 1117 participants (mean [SD] age, 33.4 [4.9] years; 562 [50.3%] pregnant), almost one-quarter (264 [23.6%]) en-

Table 1. Baseline Participant Characteristics

Characteristic	No. (%)				
	Overall (N = 1117)	Specialist		Nonspecialist	
		In person (n = 125)	Telemedicine (n = 439)	In person (n = 106)	Telemedicine (n = 447)
Age, mean (SD), y (n = 1117)	33.4 (4.9)	34.3 (4.7)	33.1 (4.7)	34.2 (4.8)	33.2 (5.1)
Perinatal status (n = 1117)					
Pregnant	562 (50.3)	61 (48.8)	224 (51.0)	52 (49.1)	225 (53.0)
Postpartum	555 (49.7)	64 (51.2)	215 (49.0)	54 (50.9)	222 (49.7)
Nulliparity (n = 1117)					
Yes	622 (55.7)	56 (44.8)	263 (59.9)	59 (55.7)	244 (54.6)
No	488 (43.7)	68 (54.4)	174 (39.6)	45 (42.5)	201 (45.0)
Prefer not to answer	7 (0.7)	1 (0.8)	2 (0.5)	2 (1.9)	2 (0.4)
Gender identity (n = 1081)					
Female	1077 (99.6)	124 (100)	421 (99.8)	106 (100)	426 (99.3)
Gender nonconforming	2 (0.2)	0	0	0	2 (0.5)
Different identity ^a	1 (0.1)	0	0	0	1 (0.2)
Prefer not to answer	1 (0.1)	0	1 (0.2)	0	0
Race and ethnicity (n = 1117) ^b					
American Indian/Alaskan Native	5 (0.4)	1 (0.8)	3 (0.7)	0	1 (0.2)
Asian	191 (17.1)	19 (15.2)	69 (15.7)	20 (18.9)	83 (18.6)
Black/African American	113 (10.1)	17 (13.6)	44 (10.0)	13 (12.3)	39 (8.7)
Hawaiian/Pacific Islander	4 (0.4)	1 (0.8)	1 (0.2)	1 (0.9)	1 (0.2)
Hispanic (Latino/Latina)	93 (8.3)	13 (10.4)	37 (8.4)	7 (6.6)	36 (8.1)
Multiracial	89 (8.0)	7 (5.6)	41 (9.3)	10 (9.4)	31 (6.9)
Other ^c	29 (2.6)	1 (0.8)	12 (2.7)	2 (1.9)	14 (3.1)
White	563 (50.4)	64 (51.2)	220 (50.1)	50 (47.2)	229 (51.2)
Prefer not to answer	30 (2.7)	2 (1.6)	12 (2.7)	3 (2.8)	13 (2.9)
Marital status (n = 1117)					
Married/stable relationship	964 (86.3)	111 (88.8)	381 (86.8)	89 (84.0)	383 (85.7)
Not married/stable relationship	139 (12.4)	14 (11.2)	52 (11.8)	17 (16.0)	56 (12.5)
Prefer not to answer	14 (1.3)	0	6 (1.4)	0	8 (1.8)
Education (n = 1117)					
Elementary school	5 (0.4)	1 (0.8)	3 (0.7)	1 (0.9)	0
High school	120 (10.7)	9 (7.2)	44 (10.0)	10 (9.4)	57 (12.8)
College or trade school	186 (16.7)	21 (16.8)	75 (17.1)	21 (19.8)	69 (15.4)
Undergraduate degree	348 (31.2)	40 (32.0)	120 (27.3)	43 (40.6)	145 (32.4)
Graduate degree	449 (40.2)	53 (42.4)	192 (43.7)	31 (29.2)	173 (38.7)
Prefer not to answer	9 (0.8)	1 (0.8)	5 (1.1)	0	3 (0.7)
Employment status (n = 1117)					
Full-time	445 (39.8)	55 (44.0)	174 (39.6)	41 (38.7)	175 (39.1)
Part-time	105 (9.4)	11 (8.8)	45 (10.3)	14 (13.2)	35 (7.8)
Maternity leave	319 (28.6)	35 (28.0)	123 (28.0)	34 (32.1)	127 (28.4)
Not employed	232 (20.8)	23 (18.4)	91 (20.7)	15 (14.2)	103 (23.0)
Other	16 (1.4)	1 (0.8)	6 (1.4)	2 (1.9)	7 (1.6)
Income, mean (SD), \$ (n = 1037) ^d	\$43 529.8 (\$16 178.8)	\$42 990.3 (\$15 984.4)	\$43 445.0 (\$15 402.5)	\$42 030.6 (\$12 670.8)	\$44 150.8 (\$17 736.5)
Pregnancy intention (n = 1117)					
I intended to get pregnant	755 (67.6)	83 (66.4)	293 (66.7)	64 (60.4)	315 (70.5)
My intentions kept changing	154 (13.8)	18 (14.4)	66 (15.0)	17 (16.0)	53 (11.9)
I did not intend to get pregnant	208 (18.6)	24 (19.2)	80 (18.2)	25 (23.6)	79 (17.7)

(continued)

Table 1. Baseline Participant Characteristics (continued)

Characteristic	No. (%)				
	Overall (N = 1117)	Specialist		Nonspecialist	
		In person (n = 125)	Telemedicine (n = 439)	In person (n = 106)	Telemedicine (n = 447)
Perinatal loss (n = 985) ^e					
Yes	430 (43.7)	55 (44.0)	155 (35.3)	51 (48.1)	169 (37.8)
No	538 (54.6)	65 (52.0)	213 (48.5)	49 (46.2)	211 (47.2)
Prefer not to answer	17 (1.7)	0	3 (0.7)	2 (1.9)	12 (2.7)
Psychiatric history (n = 1117)					
Yes	959 (85.9)	109 (87.2)	374 (85.2)	89 (84.0)	387 (86.6)
No	145 (13.0)	16 (12.8)	60 (13.7)	15 (14.2)	54 (12.1)
Prefer not to answer	13 (1.2)	0	5 (1.1)	2 (1.9)	6 (1.3)
SI during treatment (n = 1117) ^f					
Yes	264 (23.6)	25 (20.0)	116 (26.4)	20 (18.9)	103 (23.0)
No	853 (76.4)	100 (80.0)	323 (73.6)	86 (81.1)	344 (77.0)
PCL score, mean (SD) (n = 1100)	16.9 (5.4)	16.2 (5.1)	17.1 (5.5)	16.7 (5.2)	17.0 (5.5)

Abbreviations: PCL, PTSD Checklist; SI, suicide ideation.

^a One participant who selected their gender identity as "Different identity" indicated via text box, "I say female but feel like it doesn't fit."

^b Race and ethnicity were reported by participants via online self-report questionnaire (REDCap) at baseline.

^c All participants who selected their ethnicity as "Other" (n = 29) reported "Middle Eastern."

^d Income represents per capita participant-level income in US dollars based on zip code (Canadian dollars converted to US dollars).

^e Perinatal loss entails history of miscarriage, stillbirth, and/or abortion.

^f A response of yes to suicide ideation indicates a response >0 on item 10 of the Edinburgh Postnatal Depression Scale during any of the 6-8 treatment sessions.

Table 2. Analyses Comparing Participants Who Endorsed Suicide Ideation (SI) During Treatment With Those Who Never Endorsed SI

	df	t	Mean (SD)		Mean difference (95% CI)	P value	χ ^{2a}	Cramer V
			SI	No SI				
Age	1115	3.57	32.42 (5.24)	33.65 (4.77)	1.23 (0.55 to 1.90)	<.001	NA	NA
Income	1035	0.69	\$42 896.73 (15 386.11)	\$43 718.44 (16 412.13)	\$821.71 (\$-1523.05 to \$3166.70)	.49	NA	NA
PCL score	1098	-6.96	18.91 (5.28)	16.30 (5.31)	-2.61 (-3.36 to -1.88)	<.001	NA	NA
Psychiatric history	1	NA	NA	NA	NA	.04	3.98	0.06
Perinatal status	1	NA	NA	NA	NA	.91	0.01	0.00
Nulliparity	1	NA	NA	NA	NA	.28	1.17	0.03
Pregnancy intention	2	NA	NA	NA	NA	.21	3.11	0.05
Perinatal loss	1	NA	NA	NA	NA	.41	0.68	0.03
Marital status	1	NA	NA	NA	NA	.26	1.25	0.03
Education	3	NA	NA	NA	NA	.35	3.27	0.05

Abbreviations: df, degrees of freedom; NA, not applicable; PCL, PTSD Checklist.

^a See Table 1 for χ² categories.

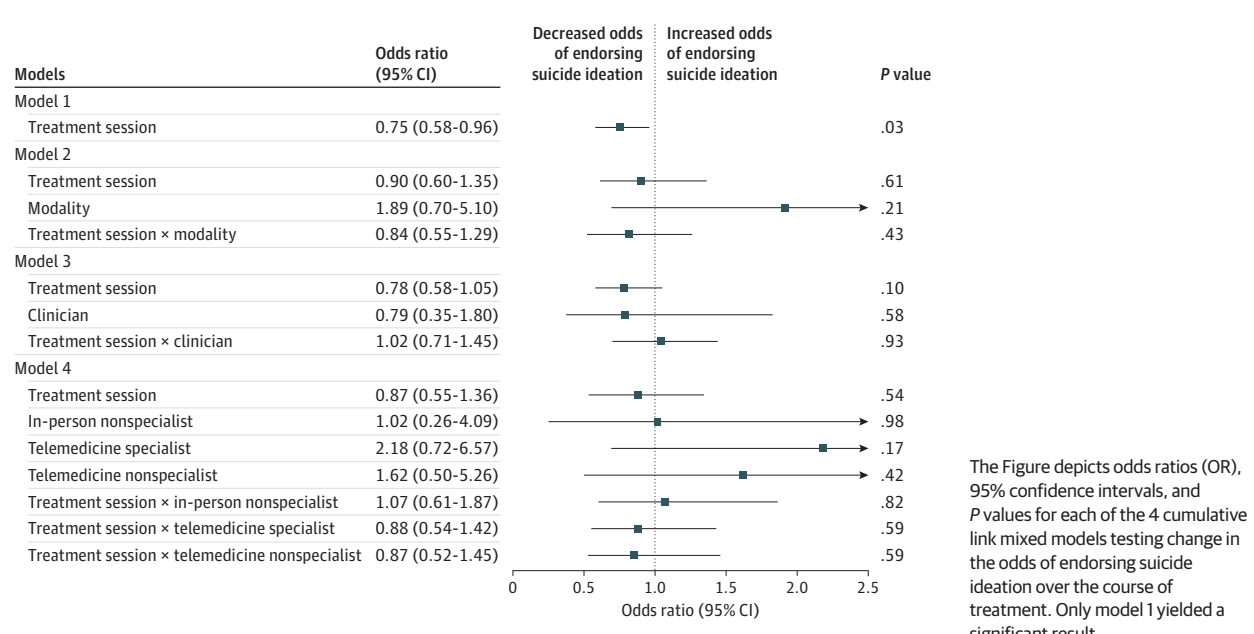
dorsed SI during treatment (Table 1). Most participants identified as women (1077 [99.6%]) and reported previously experiencing depression or anxiety (959 [85.9%]). Participants who endorsed SI during treatment were more likely to be younger ($t_{1,1115} = 3.57$; mean difference, 1.23; 95% CI, 0.55-1.90; $P < .001$), endorse more severe trauma symptoms at baseline ($t_{1,1098} = -6.96$; mean difference, -2.61; 95% CI, -3.36 to -1.88; $P < .001$), and reported a history of depression or anxiety ($\chi^2_{1,1104} = 3.98$; $P = .04$) compared with those who never endorsed SI (853 [76.4%]) (Table 2).

Primary Analyses

With each additional treatment session, the odds of endorsing SI decreased by 25% (odds ratio [OR], 0.75; 95% CI, 0.58-

0.96; $P = .03$) (Figure). Neither the main effect of clinician (OR, = 0.79; 95% CI, 0.35-1.80; $P = .58$) nor the interaction between treatment session and clinician (OR, 1.02; 95% CI, 0.71-1.45; $P = .92$) were significant, indicating no differences in the odds of endorsing SI between specialists and nonspecialists. Similarly, neither the main effect of modality (OR, 1.89; 95% CI, 0.70-5.10; $P = .21$) nor the interaction between treatment session and modality (OR, 0.84; 95% CI, 0.55-1.29; $P = .43$) were significant, indicating no differences in the odds of endorsing SI between in-person and telemedicine formats. Models examining the 4-arm randomization revealed no significant main or interaction effects (P values = .17-.98), confirming no differences in the odds of endorsing SI based on clinician-modality combinations.

Figure. Primary Analyses (Cumulative Link Mixed Models)



At 3 months postrandomization, there was an 80% decrease in the odds of endorsing SI compared to any time during treatment (OR, 0.20; 95% CI, 0.14-0.27; $P < .001$). Thoughts of death ($\chi^2_{8,606} = 15.38$; $P = .05$), suicide ($\chi^2_{8,606} = 18.34$; $P = .02$), and suicide methods ($\chi^2_{8,606} = 17.82$; $P = .02$) on the C-SSRS were more likely to be endorsed at treatment onset than any other time points (see eTable 2 and eFigure 2 in Supplement 1).

Discussion

This secondary analysis examined the substantial effects of BA on perinatal SI. Odds of endorsing SI decreased significantly over the course of treatment and at 3 months postrandomization regardless of specialist vs nonspecialist clinician or in-person vs telemedicine formats. These findings support BA as an accessible and scalable intervention for perinatal SI, which has been rising exponentially,¹³ with limited evidence-based treatments.¹⁴ In only 6 to 8 sessions, BA addresses many treatment preferences expressed by perinatal individuals with suicidality, such as increasing awareness of triggers for depressive thoughts and behaviors and alleviating hopelessness by reconnecting with core values.² Future studies should examine BA compared with other brief interventions on perinatal SI.

Ten participants of 1117 (0.9%) did not exhibit consistent reductions in SI over time or reported increases during the final treatment sessions (eFigures 1-2 in Supplement 1). These participants were more likely to be postpartum and report higher trauma and depressive symptoms at baseline. These characteristics align with research indicating that suicide risk is higher during postpartum than pregnancy and among those with psychiatric and trauma histories.¹⁵ These findings may inform recognition of perinatal patients needing additional treatment beyond BA.

Limitations

High suicide risk prompted exclusion from the SUMMIT trial, and the final sample was highly educated, suggesting some limitations in generalizability. Still, the prevalence of SI at baseline (15.0%) was higher than previously cited rates.^{8,13} In addition, the SUMMIT trial did not include a nonintervention control group.

Conclusions

BA for perinatal depression can be effectively implemented via nonspecialists and telemedicine and may be a scalable solution for reducing perinatal SI. Future studies should replicate these findings with targeted suicide measures.

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Author Affiliations: Department of Psychiatry, School of Medicine, University of North Carolina at Chapel Hill (Kaliush, Gaynes, Meltzer-Brody, Reyes-Rodríguez, Schiller); Department of

Psychology, University of Oregon, Eugene (Molina); Lunenfeld-Tanenbaum Research Institute, Toronto, Ontario, Canada (Berenbaum, Dennis, Singla); Department of Psychiatry, Temerty Faculty of Medicine, University of Toronto, Toronto, Ontario, Canada (Dennis, Vigod, Singla); Lawrence S. Bloomberg Faculty of Nursing, University of Toronto, Toronto, Ontario, Canada (Dennis); Department of Epidemiology, Gillings School of

Global Public Health, University of North Carolina at Chapel Hill (Gaynes); Department of Obstetrics and Gynecology, Endeavor Health (formerly Northshore University Health System), Evanston, Illinois (Silver); Department of Obstetrics and Gynecology, Pritzker School of Medicine, University of Chicago, Chicago, Illinois (Silver); Department of Obstetrics and Gynecology, School of Medicine, University of North Carolina at Chapel Hill (Stuebe); Department

of Maternal-Child Health, Gillings School of Global Public Health, University of North Carolina at Chapel Hill (Stuebe); Department of Psychiatry, Women's College Hospital, Toronto, Ontario, Canada (Vigod); Campbell Family Mental Health Research Institute, Centre for Addiction and Mental Health, Toronto, Ontario, Canada (Singla); Department of Psychiatry, Sinai Health, Toronto, Ontario, Canada (Singla).

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Concept and design: Kaliush, Schiller, Singla.

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Critical review of the manuscript for important intellectual content: All authors.

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