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ORIGINAL ARTICLE

Culturally grounded strategies for suicide and alcohol risk prevention delivered by rural Alaska Native communities: A dynamic wait-listed design evaluation of the Qungasvik intervention

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Abstract

We examined the effectiveness of the Qungasvik (Tools for Life) intervention in enhancing protective factors as a universal suicide and alcohol prevention strategy for young people ages 12−18 living in highly affected rural Alaska Native communities. Four communities were assigned to immediate intervention or to a dynamic wait list. Outcomes were analyzed for 239 young people at four time points over two years of community intervention. Outcomes assessed two ultimate variable protective factors buffering suicide and alcohol risk, and three intermediate variable protective factors at the individual, family, and community level. Dose dependent intervention effects were associated with growth in ultimate but not intermediate variables. This evaluation of the Qungasvik intervention provides support for the effectiveness of its Indigenous strategies for suicide and alcohol misuse prevention in this rural Alaska Native setting. Though findings did not provide support for a theory of change where growth in ultimate variables is occasioned through effects on intermediate variables, research designs focused on young people who enter intervention at lower levels of preexisting protection hold promise for better understanding of intervention change processes. The Qungasvik intervention is responsive to an acute public health need for effective rural Alaska Native suicide and alcohol risk prevention strategies.

KEYWORDS

alcohol, American Indian/Alaska Native, community based participatory research, multilevel community intervention, suicide

Highlights

- The Qungasvik intervention promotes protective factors to prevent suicide and alcohol misuse.
- We examined the effectiveness of Qungasvik in a dynamic wait-listed community-level trial.
- Intervention was associated with growth in ultimate variables protective from suicide and alcohol.
- This provides an evidence base for a rural Alaska Native suicide and alcohol prevention strategy.
- Findings support an Indigenous intervention strategy using a protective factor framework.

INTRODUCTION

Suicide and alcohol misuse among American Indian and Alaska Native (AIAN) people constitutes enormous health inequities that have persisted far too long without solution (Leavitt et al., 2018). Alaska Native (AN) youth represent a particularly high-risk group within this population (Herne et al., 2014). AN alcohol related mortality is 8 times greater than the US general population. Suicide mortality rates for AN 15−24 year olds are 7.4 times greater than the US 15−24 year old general population. Suicide is the leading cause of death for this age group and the rural region this evaluation was conducted in experienced a 143% increase in age-adjusted suicide in 2014−2018 (58 per 100,000) contrasted with 1980−1983 (22 per 100,000; Alaska Native Epidemiology Center, 2021). AN suicide frequently co-occurs with alcohol use, making this a primary determinant of pervasive AN health disparities (Allen et al., 2011). Limited research exists on effective strategies for small, geographically remote AN communities and no multisite trial has yet reported effectiveness of a rural AN suicide or alcohol prevention approach.

However, AN suicide rates are also subject to significant regional and community variation, as nested within AN cultural distinctness are notable community strengths. These protective elements of worldview, practices, and values expressed through culture hold promise in tailoring effective prevention strategies. In accord with other Indigenous communities responding to this crisis (Wexler et al., 2015), AN people have advocated for prevention that uses Indigenous culture (Substance Abuse and Mental Health Services Administration, 2018) through strategies grounded in Indigenous knowledge and practices, based in local expertize, directed through Tribally controlled structures, and delivered by community members.

Yup'ik/Cup'ik are the main AN cultural linguistic group in southwest Alaska and the largest AN group. *Qungasvik* (phonetic: kung-az-vik, Tools for Life) is a multilevel intervention for rural *Yup'ik* young people ages 12−18. Qungasvik adopts the community intervention paradigm, which aims to promote community resilience, defined as a sustained ability to use available resources in effective response to systemic disruption (Trickett et al., 2011). The Qungasvik intervention responds to significant, recent colonial disruption to the ancestral *Yup'ik* way of life, by emphasizing (a) cultural assets over community deficits, (b) a *Yup'ik* explanatory model, theory of intervention change process, and implementation approach, and (c) strategies of resistance and adaptation to historical and current structural discriminations impacting AN communities, as guided by *Yup'ik* culture and its Indigenous knowledge base. Qungasvik modifies socioecological factors at the community level, builds relationships at the family level, and provides experience in cultural, relationally-based coping skills at the individual level.

In contrast to conventional risk factor reduction approaches to suicide prevention, Qungasvik adopts a strength-based protective factor framework (Allen, Wexler, et al., 2022). The framework identifies factors linked through theory and research as protective from suicide and alcohol misuse. The Qungasvik intervention fosters growth in promotive, or direct protective mechanisms that promote well-being as understood through Indigenous definitions, and ameliorative or indirect protective mechanisms that buffer suicide and alcohol risk.

A Tribally directed 25-year community based participatory research (CBPR) relationship between *Yup'ik* community members and university researchers described an Indigenous theory of protection and prevention strategies (Allen, Mohatt, Beehler et al., 2014; Rasmus et al., 2019). The collaboration is now testing these strategies to establish Qungasvik as an evidence-based practice. Previous studies have demonstrated feasibility (Allen et al., 2009; Mohatt et al., 2014) and promising outcomes (Allen et al., 2018).

This article reports a test of the impact of the Qungasvik intervention in four rural *Yup'ik* communities in Southwest Alaska. The first goal is to measure impact after two years of intervention in longitudinal growth on two ultimate outcomes of ameliorative protective factors that buffer suicide and alcohol misuse risk. A second goal is to examine the impact of the intervention on three promotive protective factors as intermediate outcomes at the individual, family, and community level.

METHODS

Setting

Rural *Yup'ik* communities in southwest Alaska are off the road system and accessed by small plane, boat, or snowmobile. In contrast to the reservation system of the lower 48 states, each community is a federally recognized Tribal entity; residents are shareholders in Calista, one of 12 for-profit AN Regional Corporations. Ethnicity in these communities is over 90% *Yup'ik*/Cup'ik. Older adults may speak *Yup'ik* as a first language, while most children and people under the age of 40 learned English as their first language and may or may not speak *Yup'ik*. A mixed subsistence economy augments a limited number of paid jobs primarily in government, health care, and schools. High transportation costs for consumer goods place heavy economic burden in a region that is the fourth lowest per capita income county in the United States. As a result, food is heavily dependent on local fish, birds, and land and marine mammals. At the time of intervention, the participating communities used the Alaska local option law to declare themselves *dry* (importation and possession of alcohol is illegal), though shifts occur when communities vote to *damp* status (importation and possession is legal, sale is illegal). The Yukon Kuskokwim Health Corporation (YKHC), a regional nonprofit corporation that provides health care through compacting provisions of Titles I and V of the Indian Self-Determination and Education Assistance Act, also provides health research ethics oversight on behalf and by permission of the regional Tribes.

ALLOCATION TO INTERVENTION

Randomization to wait-list status in a dynamic wait-listed design (DWLD) with four measurement time points was acceptable to the communities and their representative human studies committee in lieu of a control condition (Allen et al., 2018). The first three communities were randomized at the level of community as the intervention is intended to be a community level intervention. At the end of the intervention in Community 3, opportunity to test outcomes in an additional community occurred through award of a dissemination grant. The award funded intervention in a new community for development of a training model codirected by community-based staff from previous intervention communities. One strength of the DWLD is its capability to add communities to a trial when opportunity arises (Wyman et al., 2015). In accordance with intent to treat analysis, we report Community 4 outcomes, which because of this history was not randomly assigned a start time at the beginning of the trial.

RECRUITMENT

A parent guardian gave informed consent for both assessment and intervention for young people ages 12−19 enrolled at baseline. Young adults (age 18+) gave their consent. All other youth participants gave assent following parent consent. Young people received $25 to complete assessment at each time point. In response to expressed community preferences that aligned with *Yup'ik* cultural values emphasizing respect for individual autonomy and decision making, including the autonomy of children, participation in any intervention activity was an independent youth decision without requirement, or expectation to engage in other activities. Many young people found paid assessment, often as a break from classroom time, sufficiently interesting to encourage participation. A smaller, but substantial proportion of community youth also engaged in the longer duration intervention activities that were unpaid and occurred after school, or on weekends and evenings. The University of Alaska Fairbanks IRB, the YKHC Human Studies Committee, and the Tribal Councils of each community approved this study.

PARTICIPANTS

Figure 1 presents a CONSORT flow diagram. In total, 281 young people were recruited. Of these, 258 completed Wave 1 assessments, 228 completed Wave 2, 194 completed Wave 3, and 204 completed Wave 4; 146 youth completed all 4 assessments, 59 completed 3, 47 completed 2, and 29 completed 1 assessment. Loss to follow-up was typically related to two factors: frequent out migration to urban centers or other rural communities, or school absence during the assessment team travel window. Two youth were withdrawn from the study. Exclusion criteria included (a) intellectual disability, (b) random, inconsistent, and invalid responding, and (c) multivariate outlier. Five youth with an intellectual disability diagnosis participated in assessments with staff

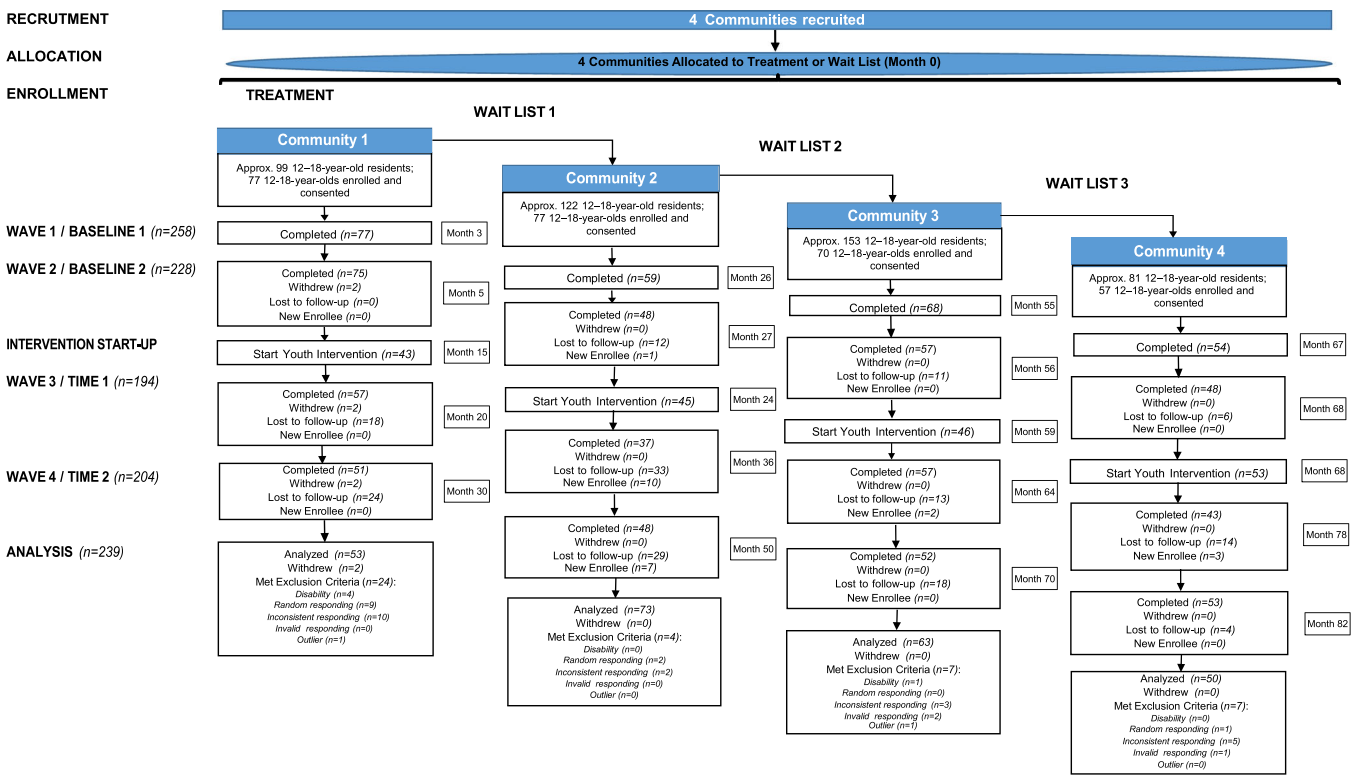

FIGURE 1 CONSORT flow diagram [Color figure can be viewed at wileyonlinelibrary.com]

assistance, in accordance with their wish to participate with peers, and are not included in analysis. Response style exclusions included (a) random responding (time stamp <10 s per item; $n = 12$), (b) inconsistent responding (>2SD difference between Baseline 1 and 2 scores on the two ultimate outcomes; $n = 20$), and (c) invalid responding (all items at maximum [20] except for at least two of the three reverse keyed items at minimum [1]; $n = 3$). Finally, two multivariate outliers were identified using hierarchical cluster analysis (Henry et al., 2005), a statistical method that detects homogenous clusters by iteratively grouping cases based on distance computation.

Data from 239 young people were analyzed, representing approximately 53% of the age 12−18 population in these four communities (Alaska Department of Commerce Community, and Regional Affairs, Division of Community and Economic Development, 2021). Table 1 summarizes participant characteristics by community. Mean age was 14.9 years (SD = 2.0). Gender distribution was 49% female and 51% male, with no credible age difference between males and females ($\beta_{gender} = -0.26$; 95% credibility interval [CI]: = [−0.76 to 0.22]). Dose, expressed as individual participation in intervention activities, indicates intervention reach increased in later implementations of the wait-listed communities and limited intervention reach in Community 2.

INTERVENTION

Qungasvik implements intervention modules creating episodes of *Yup'ik* cultural engagement. In traditional *Yup'ik* practices before formal western schooling, the education and training of young people included introduction to cultural protocols, knowledge, and values while learning skills through participation in daily activities of family and community life such as subsistence, tool-building, and ceremony (Rasmus et al., 2014). The intervention manual (Qungasvik Team, 2018) provides outlines for 18 modules described as teachings, and conducted at the individual, family, or community level through one or more 1−3 h sessions. Each module promotes 2−4 of a total of 13 protective factors.

Qungasvik is an Indigenous intervention defined through four characteristics: (a) Indigenous local control, (b) an Indigenous cultural model of change, (c) Indigenous theory-driven implementation, and (d) an Indigenous approach to knowledge development (Rasmus et al., 2019). The Qungasvik manual provides basic module outlines. As a Tribally directed CBPR intervention, implementation requires a process of adaptation that is preceded by an extensive community development process to facilitate project direction by local community members. Adaptation enhances fit to the uniqueness in each of these geographically dispersed *Yup'ik* communities, and to the seasonal influences on activities and practices in a climatically extreme environment. In addition to enhancing fit, the adaptive process fosters community ownership by emphasizing local control over the intervention implementation. As a community intervention, Qungasvik is a complex or multilevel intervention best understood through the form versus function distinction (Trickett, 2011). While components or form of the intervention may vary by community in response to context, the prescribed function of each

TABLE 1 Demographic characteristics of intervention participants by community ($N = 239$)

Variable	Community 1	Community 2	Community 3	Community 4	Overall
Gender (%)					
Male	33 (62)	33 (45)	31 (49)	25 (50)	122 (51)
Female	20 (38)	40 (55)	32 (51)	25 (50)	117 (49)
Mean age (SD)	14.9 (2.0)	14.6 (2.1)	15.3 (2.4)	14.9 (1.7)	14.9 (2.1)
Parental marital status (%)					
Married	39 (74)	28 (44)	28 (56)	28 (38)	123 (51)
Divorced	5 (9)	9 (14)	4 (8)	3 (4)	21 (9)
Adults living at home (%)					
Mother	35 (66)	46 (73)	32 (64)	47 (64)	160 (67)
Father	33 (62)	32 (51)	31 (62)	34 (47)	130 (54)
Grandparent	11 (21)	5 (8)	6 (12)	13 (18)	35 (15)
Other relative	9 (17)	10 (16)	3 (6)	10 (14)	32 (13)
Dose (number of activities attended)					
Mean dose (SD)	3 (5)	1 (2)	7 (10)	10 (9)	5 (8)
Maximum dose	23	7	41	44	44

Qungasvik module remains the delivery of a particular set of protective factors. Adherence to this function defines Qungasvik fidelity instead of intervention form, which is instead typically operationalized through repetition of identical components in the intervention activities (Henry et al., 2012). Fidelity in Qungasvik involves (a) implementation of a *Yup'ik* Indigenous community organizing process for adaption and leadership of the intervention (Rasmus et al., 2019), and (b) delivery of the protective factors assigned to each module (Qungasvik Team, 2018). Cultural protocols guide a community process described in *Yup'ik* as *qasgirarneq* (encircling) that in part, includes (a) always coming together as a group to plan important activities, (b) identifying those with expertize to carry out the activity, and (c) debriefing following the activity on where it has succeeded in its goals and what has been learned. Cultural experts are selectively nominated from the community for planning and delivery of different modules based on their specialized expertize. Individuals recognized as Elders for their cultural knowledge and leadership are extensively involved. The implementation model includes a process of staff training, relationship building with Elders, and coalition building with community partners and families of young people. This community development process varies in time by community and can occupy a year or more before the delivery of activities to youth.

Maliqianeq (seal hunt) is an example of adaptive implementation of a module that is focused at the individual level. The module, *Nunam Aulukaakut* (The Land Provides for Us) offers an outline for components on training in safety, team work, and hunting skills that highlight elements of *Yup'ik* worldview (Qungasvik Team, 2018). During maliqianeq, *Yup'ik* concepts of *mercecineq* describe how the seal decides to give up life as a gift to the hunter, while *allaniuneq* dictates how hunters in response to this gift do such things as offer water to the seal and place the head toward the river while cutting the animal up to ensure its spirit safe journey home. Through these activities and instruction, this module's function promotes two protective factors: *Ellangneq* (to become aware), an important growth process within a *Yup'ik* theory of human development (Allen, Mohatt et al., 2011), and *Kayunkut* (communal mastery), problem solving strategies involving relationally joining with others to draw on their skills and support (Fok et al., 2012). Other adaptive implementation examples of this module include hunting beluga whales and walrus in coastal communities, and moose in riverine communities; all deliver these same protective factors. Description of other multilevel elements of this intervention and examples of modules at the family and community level appear in Supporting Information: Appendix. More detailed description of this community intervention, including its multilevel characteristics, and the *Yup'ik* system of knowledge guiding it are found in a journal special issue (Allen & Mohatt, 2014).

MEASURES

Multiple considerations led to a decision to measure protective factors as outcomes over more conventional alcohol and suicide assessments such as quantity and frequency of alcohol use (Allen et al., 2012) or suicide ideation, plan, attempt, and death (Allen, Rasmus, et al., 2021). *Yup'ik* community members expressed discomfort and cultural incongruence with the direct questioning of individuals found in conventional alcohol and suicide assessments, and with their problem and pathology foci. Additionally, impacts of the direct assessment of ideation, plan, and attempt in communities experiencing high suicide rates that include the tragedy of youth suicide clusters have not yet been sufficiently investigated, with the potential to create harm, including retraumatization. Further, unresolved measurement questions persist regarding direct assessments of suicide behavior in selected high-risk settings. For example, research on ideation has produced repeated findings of underreporting among at-risk groups (Anestis & Green, 2015; Cukrowicz et al., 2013), limited association with suicide (McHugh et al., 2019), and distinct patterns of suicide without ideation (Romanelli et al., 2021). Further, there is limited research on the estimation of risk in community settings where ongoing presence of suicide can result in ideation persistently in people's thoughts, with potential for shifts in the equivalence of suicide ideation items. Moreover, suicide is a low base rate phenomenon. Even among high-risk groups, demonstration of intervention effects on suicide death and attempt rates in small population communities is typically not statistically feasible without time frames potentially spanning decades, if at all. For underage young people, alcohol use in a dry community is doubly illegal, can be highly stigmatized, and even anonymous endorsement of use can negatively reflect on one's entire peer group in small communities. Participants in our earlier studies described in debriefing interviews with our team initially underreporting on baseline alcohol use measures before relationship and trust were established, and on later assessments in the time series more accurately reporting actual use. Finally, protective factor measures more directly assess theory driven impacts of the Qungasvik intervention.

A mixed methods CBPR measurement development effort (Gonzalez & Trickett, 2014) created *Yup'ik* culture specific assessments of the protective outcomes that the Qungasvik intervention is intended to produce. These five multidimensional measures were refined and tested for psychometric properties and validity using an iterative confirmatory factor analysis and item response theory (IRT) approach across multiple *Yup'ik* samples (Allen et al., 2012, 2006, 2021; Fok et al., 2012, 2014) and a path analytic test of the measurement model (Allen, Mohatt, Fok et al., 2014). In the Qungasvik theory of change, proximal effects of intervention activities occasion change on three intermediate variables that are promotive protective factors at the individual, family, and community level. These are hypothesized to influence change on two ultimate

variables that are ameliorative protective factors buffering suicide and alcohol misuse risk.

The response format used an analog scale with a pointer in the shape of a salmon that the respondent slid in a continuous motion across a horizontal blue water background, with three equidistant semantic anchors placed below, "*Not at all*," "*Somewhat*," and "*A lot*." On the backside, this continuous scale was divided into 20 equal intervals, allowing for a 20-response option score. The mean item score on relevant items composed the outcome measure score.

Intermediate outcomes

Elluarrluni piyugngariluni

Elluarrluni piyugngariluni: "Learning in the mind of doing things in a masterful way" (Individual Characteristics [IC]) is composed of items from the Multicultural Mastery Scale (Fok et al., 2012) tapping communal mastery achieved through joining with friends (*Mastery-Friends*) and family (*Mastery-Family*) along with one new subscale, *Wanting to Become a Role Model. Elluarrluteng ilakelriit*: "Nurturing family" (Family Characteristics [FC]) includes *Cohesion* and *Expressiveness* subscale items from the Brief Family Relationship Scale (Fok et al., 2014) along with two new subscales tapping *Affection and Praise* and *Parents as Role Model. Nunamta*: "Our community" (Community Characteristics [CC]) adapts items from the adult *Yup'ik* Protective Factors scale (Allen et al., 2006) to compose the *Opportunities* subscale and adds two new subscales, *Connection with Elders* and *Community Role Models*. This measure's *Support* subscale is used to assess an individual's preexisting level of protection before intervention.

Ultimate outcomes

Umyuangcaryaraq: "Reflecting" (Reflective Processes [RP]) taps reflection on potential negative consequences from alcohol misuse situated within a *Yup'ik* cultural context (Allen et al., 2012). Representative items chosen for high sensitivity to change include "I would feel embarrassed to have drinking in my family" and "I do not want to lose control of myself." *Yuuyaraqegtaar*: "A way to live a very good, beautiful life" (Reasons for Life [RL]) taps elements that provide meaning to one's life. These include *Yup'ik* culture specific beliefs and experiences that make life enjoyable and worthwhile (Allen, Rasmus, et al., 2021). Items include "My Elders teach me that life is valuable" and "People see I live my life in a Native way."

ANALYTIC APPROACH

This evaluation adopts an integrative approach to small sample research. The approach uses optimization strategies based in (a) contemporary measurement methods that enhance precision and responsivity, (b) research designs that offer both rigor and efficiencies through more complete use of available information, and (c) Bayesian procedures that are better equipped to analyze small numbers of observations and that make use of prior information in their estimations (Henry et al., 2015). Contemporary measurement methods included the use of IRT techniques to select high functioning items to enhance precision, reduce measurement error, and increase responsiveness or sensitivity to intervention change (Fok & Henry, 2015). Research design elements emphasized the reduction of within-group variance unrelated to intervention and the use of within subjects contrasts; planned contrasts were restricted to those of theoretical interest based in the intervention theory of change (Hopkin et al., 2015). Where appropriate, variables such as dose were conceptualized as ordinal data to not assume linearity with equal intervals of impact, and to account for floor and ceiling effects (Hedeker, 2015). The DWLD was selected as a research design whose elements were responsive to community preference while also maximizing statistical power. DWLD offers a longer time period for comparing social units receiving intervention, and its comparisons of post to preintervention scores combine explorations within each time series and across time series (Wyman et al., 2015). Finally, Bayesian estimation maximizes the yield of small samples through its flexibility in modeling and the greater efficiencies created through its capability to use prior data from studies in our long-term research collaboration (Kadane, 2015). The Supporting Information: Appendix provides more detailed description of the methodology for these measurement and design strategies and includes examples of how these strategies were implemented in this study.

The *Qungasvik* intervention is intended as a community-wide intervention. We constructed an analytic model to address implementation and design challenges common to community intervention (Schensul & Trickett, 2009; Trickett et al., 2011) and to small sample research (Hopkin et al., 2015). These challenges are amplified in the Qungasvik setting in ways that are similar to other geographically remote locations and in ways that align with the uniqueness of this *Yup'ik* cultural context. As described above, in accord with *Yup'ik* cultural values, exposure to intervention was adaptive to individual choice while also nested within community choice. Additionally, an adaptation process localized the intervention into the culture of each community. Also consistent with these cultural values, activities were open to all. Late enrollees were accepted at any time during the intervention as word of mouth generated additional interest in these tightly linked communities. This reflects how the Qungasvik intervention would be implemented in practice in *Yup'ik* contexts. To accommodate individual choice in attendance, dose was included in the analysis model. To accommodate rolling start dates, intervention start date was individually centered using each individual's start date.

To evaluate intervention effects over time in contrast to baseline, and in response to intervention dose in contrast to low dose exposure, we created Bayesian linear mixed effects models. These models tested for effects of time, dose, and

preexisting level of protection, along with gender and age. Baseline 1 (B1) and Baseline 2 (B2) were before intervention, Time 1 (T1) was midway through intervention, and Time 2 (T2) followed approximately two years of intervention. Models allow for the clustering of observations within individuals, the unequal spacing of study time points, the evaluation of impact of several potential confounding variables that include preexisting differences in protection for each individual, and the duration of intervention participation for each individual. On level 1, time in intervention (in months) is individually centered at the person's intervention start date. On level 2, dose is composed of three indicator variables where attendance at 0−2 intervention sessions is categorized as low, 3−6 as medium, and 7+ as high. The medium dose (mDose) and high dose (hDose) variables each provide contrasts with the low dose (lDose) group. Preexisting protection is the grand mean centered Community Support subscale score at B1. Gender is self-identified male or female. Age is in years at B1. At level 1, the level of time, the outcome variable at each of the four time points is predicted from an individual intercept and linear time slope. At level 2, the individual level, the level 1 intercept and linear time slope are predicted by mDose, hDose, preexisting protection, gender, and age. In standard notation, the model can be expressed as follows:

Level 1 (time):

$$y_{it} = \beta_{0i} + \beta_{1i}(time) + e_{it}.$$

Level 2 (individual):

$$\beta_{0i} = \gamma_{00} + \gamma_{02}(\text{protection}) + \gamma_{03}(\text{mDose}) + \gamma_{04}(\text{hDose}) + \gamma_{05}(\text{gender}) + \gamma_{06}(\text{age}) + u_{0i}.$$

$$\beta_{1i} = \gamma_{10} + \gamma_{12}(\text{protection}) + \gamma_{13}(\text{mDose}) + \gamma_{14}(\text{hDose}) + \gamma_{15}(\text{gender}) + \gamma_{16}(\text{age}) + u_{1i}.$$

Models were estimated through Bayesian estimation using Mplus 8.7 (Muthén & Muthén, 1998−2021). Analyses adhere to transparency guidelines for Bayesian statistics (Depaoli & van de Schoot, 2017; Kruschke, 2021). Complete informed priors and distributions appear in Supporting Information: Table S1. More detailed information on the Bayesian estimation procedures and a sensitivity analysis appears in the Supporting Information: Appendix and Supporting Information: Figure S1.

RESULTS

Operating characteristics of the outcome measures

Table 2 reports number of items for each measure; composite, item separation, and person separation reliabilities and scale intercorrelations at Wave 2; and mean item scores and standard deviations at Waves 1−4. Composite reliabilities (Raykov & Marcoulides, 2011) ranged from good to excellent ($\rho = 0.70-0.91$). While composite reliability taps item interrelation in multidimensional scales, sensitivity to change is more directly assessed through item separation and person separation reliability. These use Rasch analysis techniques based in IRT conceptions (Bond & Fox, 2007). Item separation indexes the extent the sample of individuals is adequate to scale the item set; this confirms item hierarchy in the scale. Item separation reliabilities indicated this sample displays excellent capabilities to scale each measure (0.93−0.98). Person separation indexes the extent items separate individuals according to their level of the latent trait; this taps each measure's ability to track different levels of the attribute and through it, change in response to intervention. Person separation reliabilities displayed somewhat more limited capabilities to index individuals at different levels of the latent trait. IC, FC, CC, and RL displayed moderate to good capabilities (0.52−0.78), while RP capabilities are only fair (0.31). Intercorrelation among outcomes was generally low to moderate ($r = 0.37-0.61$), suggesting each measure tapped unique variance across separate dimensions, with the exception of IC with FC, which was high ($r = 0.74$).

EVALUATION OF INTERVENTION EFFECTS

Table 3 summarizes variables in the Qungasvik measurement model while Table 4 reports results from the Bayesian linear mixed effects model. Table 4 includes unstandardized slope estimate, standard deviation of the posterior distribution (SD), 95% CI, and standardized slope estimate, which provides a measure of effect size (Cohen, 1988). Due to the complexity of the models, outcomes on IC, FC, CC, RL, and RP are summarized at level 1 for time and at level 2 for the interaction of time by mDose (medium dose), hDose (high dose), protection (preexisting protection), gender, and age. Models displayed excellent posterior predictive qualities: plots displayed tight, horizontal traces, normal posterior distributions, and low autocorrelation with potential scale reduction factor less than 1.01.

Findings displayed a time x hDose interaction on both ultimate outcomes. High dose in contrast to low dose intervention produced greater credible growth in RL, a measure of protective factors buffering suicide ($\beta = 0.29$; 95% CI: = [0.05−0.49]). For RP, a measure of protective factors buffering alcohol risk, high dose in contrast to low dose also produced greater credible growth ($\beta = 0.31$; 95% CI: = [0.09−0.50]). The standardized slope estimates for time x hDose provide estimates of effect size and were 0.29 for RL and 0.31 for RP, which are small effects (Cohen, 1988). Time x mDose did not produce credible effects on ultimate variables. While neither time x protection nor time x gender produced credible effects, a credible time x age interaction ($\beta = 0.28$; 95% CI: = [0.05−0.49]) suggested

TABLE 2 Psychometric properties and mean scale scores at Wave 1–4 measurement points on outcomes measures

Scale	Reliability				Intercorrelation				Mean item score			
	Number of items	Composite reliability (omega)	Item separation reliability	Person separation reliability	1	2	3	4	Wave 1 (N = 219) M (SD)	Wave 2 (N = 190) M (SD)	Wave 3 (N = 161) M (SD)	Wave 4 (N = 175) M (SD)
1 Individual Characteristics (IP)	10	0.87	0.94	0.66					17.12 (2.59)	16.82 (2.76)	17.04 (2.61)	16.88 (2.62)
2 Family Characteristics (FP)	13	0.91	0.96	0.78	0.74				15.45 (3.01)	15.48 (3.27)	15.52 (2.92)	15.61 (3.03)
3 Community Characteristics (CC)	7	0.76	0.94	0.52	0.58	0.61			16.29 (3.08)	16.21 (3.13)	16.35 (3.03)	16.15 (3.19)
4 Reasons for Life (RL)	6	0.77	0.98	0.63	0.61	0.58	0.40		15.95 (2.56)	16.06 (2.73)	16.05 (2.65)	16.10 (2.84)
5 Reflective Processes (RP)	6	0.70	0.93	0.31	0.45	0.42	0.42	0.37	17.23 (2.92)	16.89 (3.17)	17.06 (2.98)	17.03 (2.82)

Note: Reliabilities computed using Wave 2 data. To allow for item response theory analyses, number of parameters was reduced by recoding the response scaling from 20 to 5 for computation of item separation and person separation reliabilities.

TABLE 3 Qungasvik outcomes measurement model for evaluation of intervention effects

Intermediate variables		Direct promotive protective factors
IC	Individual Characteristics	Communal Mastery
		Becoming a Role Model
FC	Family Characteristics	Cohesion
		Expressiveness
		Affection and Praise
		Parents as Role Models
CC	Community Characteristics	Opportunities
		Connection with Elders
		Community Role Models
Ultimate Variables		**Indirect Ameliorative Protective Factors**
RL	Reasons for Life	Efficacy over Life Problems
		Cultural and Spiritual Beliefs
		Others Assessment of Me
RP	Reflective Processes about alcohol consequences	Things I Want for Myself
		Things I Want for My Family
		Things I Want for My Way of Life
Dose		**Youth Attendance at Qungasvik Activities**
lDose	Low Dose	0–2 sessions
mDose	Medium Dose	3–6 sessions
hDose	High Dose	7+ sessions
Protection		**Preexisting Protection at Baseline**

Note: Abbreviations of variables used in the model appear in **boldface**.

growth in RL but not RP over time with increasing age of participant. These effects on ultimate variables are graphically depicted in Figure 2. On RL, lines at month 0 are at near identical scores with greatest slope displayed by hDose. On RP, hDose displays greatest slope while additionally crossing the slope lines of mDose and lDose.

Findings for IC, FC, and CC as intermediate variables did not provide support for the theory of change model, which proposes change on ultimate variables is occasioned through change on intermediate variables. Results for IC, FC, and CC displayed no credible time x hDose interactions. FC alone displayed credible time x protection ($\beta = -0.24$, CI [−0.45, −0.02] and time x gender ($\beta = 0.23$, CI [−0.44, −0.01] effects; over time less protected young people and boys displayed greater increase in FC.

TABLE 4 Summary of Bayesian linear mixed effects model of outcomes results ($N = 239$)

	Unstandardized B slope estimate	Posterior SD	95% CI LL UL	Standardized β slope estimate (effect size)	95% CI LL UL
Individual Characteristics (IC)					
Time	−0.018	0.024	[−0.064 to 0.029]	−0.251	[−0.904 to 0.380]
Time x mDose	−0.004	0.024	[−0.052 to 0.043]	−0.023	[−0.274 to 0.220]
Time x hDose	0.006	0.024	[−0.041 to 0.051]	0.036	[−0.237 to 0.308]
Time x protection	−0.004	0.002	[−0.009 to 0.001]	−0.200	[−0.438 to 0.049]
Time x age	0.007	0.005	[−0.003 to 0.016]	0.191	[−0.090 to 0.470]
Time x gender	−0.018	0.018	[−0.054 to 0.018]	−0.124	[−0.368 to 0.129]
Family Characteristics (FC)					
Time	0.008	0.026	[−0.043 to 0.059]	0.086	[−0.473 to 0.637]
Time x mDose	−0.041	0.026	[−0.093 to 0.010]	−0.172	[−0.382 to 0.042]
Time x hDose	0.005	0.026	[−0.046 to 0.054]	0.022	[−0.210 to 0.258]
Time x protection	−0.006	0.003	[−0.011 to 0.000]*	−0.242	[−0.450 to −0.020]*
Time x age	0.007	0.005	[−0.004 to 0.017]	0.158	[−0.086 to 0.396]
Time x gender	−0.041	0.020	[−0.08 to −0.001]*	−0.230	[−0.441 to −0.008]*
Community Characteristics (CC)					
Time	−0.015	0.028	[−0.069 to 0.041]	−0.170	[−0.792 to 0.447]
Time x mDose	−0.040	0.028	[−0.096 to 0.014]	−0.176	[−0.404 to 0.060]
Time x hDose	0.007	0.027	[−0.047 to 0.061]	0.036	[−0.226 to 0.305]
Time x protection	−0.004	0.003	[−0.009 to 0.002]	−0.160	[−0.387 to 0.090]
Time x age	0.005	0.006	[−0.006 to 0.017]	0.124	[−0.147 to 0.393]
Time x gender	−0.008	0.021	[−0.050 to 0.034]	−0.048	[−0.288 to 0.194]
Reasons for Life (RL)					
Time	−0.037	0.024	[−0.084 to 0.009]	−0.432	[−0.908 to 0.111]
Time x mDose	0.039	0.024	[−0.008 to 0.088]	0.172	[−0.038 to 0.369]
Time x hDose	0.057	0.024	[0.011 to 0.103]*	0.287	[0.054 to 0.494]*
Time x protection	−0.004	0.002	[−0.009 to 0.000]	−0.197	[−0.395 to 0.013]
Time x age	0.012	0.005	[0.002 to 0.021]*	0.284	[0.051 to 0.491]*
Time x gender	−0.021	0.018	[−0.057 to 0.015]	−0.125	[−0.338 to 0.089]
Reflective Processes (RP)					
Time	−0.043	0.031	[−0.105 to 0.019]	−0.349	[−0.811 to 0.156]
Time x mDose	0.012	0.033	[−0.052 to 0.075]	0.038	[−0.163 to 0.222]
Time x hDose	0.088	0.032	[0.026 to 0.150]*	0.306	[0.091 to 0.503]*
Time x protection	−0.005	0.003	[−0.011 to 0.002]	−0.151	[−0.331 to 0.050]
Time x age	0.005	0.007	[−0.008 to 0.017]	0.077	[−0.144 to 0.285]
Time x gender	0.004	0.025	[−0.044 to 0.053]	0.017	[−0.178 to 0.216]

Abbreviatons: CI, credible interval; LL, lower limit; UL, upper limit.

*Credible interval does not cross zero.

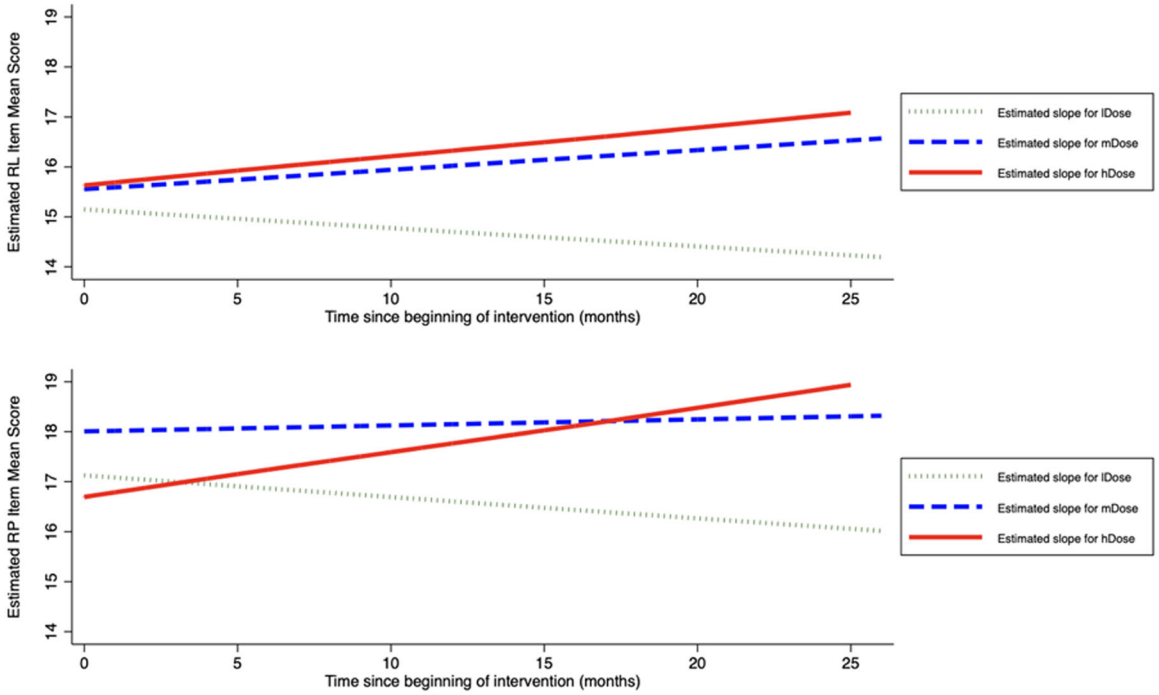

FIGURE 2 Reasons for Life (RL) and Reflective Processes about Alcohol Consequences (RP) estimated slopes by intervention group. lDose, low intervention dose (attendance at 0−2 sessions); mDose, medium intervention dose (attendance at 3−6 sessions); hDose, high intervention dose (attendance at 7−44 sessions). Green fine segmented line represents the estimated slope for lDose; blue segmented line represents the estimated slope for mDose; and red solid line represents the estimated slope for hDose. Color in online version only. [Color figure can be viewed at wileyonlinelibrary.com]

DISCUSSION

This multisite trial tests a community-level intervention (Trickett et al., 2011) that uses a protective factor framework (Allen, Wexler, et al., 2022) for the prevention of suicide and alcohol misuse among rural AN youth. Qungasvik creates and implements cultural scripts of *Yup'ik* practices that traditionally provided instruction to young people in an Indigenous knowledge system (Rasmus et al., 2014). The instruction and aligned cultural worldview offer protective beliefs, attitudes, and skills to buffer risk and promote well-being in this Indigenous context.

The Qungasvik intervention was associated with dose dependent growth in reasons for life and reflective processes on alcohol consequences as protective factors buffering suicide and alcohol risk in AN young people. Notably, there were no gender differences in Qungasvik recruitment and retention rates or intervention effects. Results provide, to our knowledge, first empirical support using the Western science methodology of a multisite trial for (a) an Indigenous intervention, (b) cultural practices as intervention, (c) a protective factor framework for AIAN suicide and alcohol prevention, and (d) a suicide and alcohol prevention strategy for rural AN communities. Findings address a public health priority by demonstrating how cultural practices can provide protective experiences for Indigenous young people to buffer suicide and alcohol risk. A protective factor framework has high acceptability in rural AN communities where thus far, existing approaches have failed to document effectiveness, and Qungasvik has equal reach and impact with males who as a group are at heightened risk for suicide death. These findings have research and broad clinical significance for work with *Yup'ik*, AN, and Indigenous young people and their families. Outcomes highlight the promise of strengths-based perspectives to provide an alternative to clinical approaches for suicidality and alcohol misuse risk that are focused through a pathology-based lens. Further, by attending to the systemic disruption of colonialism on Indigenous peoples, Qungasvik addresses impacts of structural racism contributing to *Yup'ik* suicide and alcohol risk (Allen, Wexler, et al., 2022).

This study was facilitated through recent developments in small sample methods (Henry et al., 2015). These methods integrate advances in measurement, statistics, and research design as optimization strategies. The study provides a generalizable case example in use of these methods to address shared challenges in other areas of health disparities science conducting research to establish an evidence base for practices with small, culturally distinct racial and ethnic groups, and other groups experiencing marginalization, who are at heightened risk for health inequities.

Consistent with negative findings from previous research (Allen et al., 2018; Mohatt et al., 2014), the Qungasvik intervention was associated with effects on ultimate but not intermediate variables; we were unable to identify change in promotive protective factors as mechanisms for change. One promising avenue for future research involves the low protection group. Inspection of

the data plots in this study suggest impacts on intermediate variables were most prominent among youth with low preexisting protection. As a mechanism of change, growth in these promotive protective factors may be important for young people with low levels of pre-existing protection but less critical for young people who already experience relatively high protection. The current study design required three-way interactions to test this hypothesis and with limited number of low protection observations, this overwhelmed our model. A future study harmonizing the current data with our previous feasibility studies could potentially provide sufficient observations to explore this mechanistic hypothesis through low preexisting protection subgroup analysis.

There are important limitations to interpretations from these findings. Several of these limitations relate to experimental control. For reasons aligned with intent to treat analysis, start date was not randomized in the fourth intervention community. Further, assignment to dose group was not at random. While the analysis accounted for age, gender, and preexisting protection, selection bias may have influenced results.

Measurement limitations include psychometric limitations in the person separation capabilities of RP, and interrelation of IC and FC. All outcome measures relied on youth self-report, limiting assessment to a single method. Further, youth assess a limited number of domains on the community level. In response, we are currently developing an adult self-report measure of community protective factors. The measure directly assesses community resources the Qungasvik intervention seeks to promote hypothesized to associate with lower community level suicide rates. There are additional limitations with this study's binary conception of gender.

Other limitations include the reach of intervention. The reach of high dose exposure did not extend to most youth. Additionally, though the intervention in all four community implementations included module activities at the individual, family, and community levels, we found individual level activities were most represented in the activities conducted, while family activities with parents were both least well attended and least often conducted.

Findings from preliminary analyses (Allen et al., 2018) informed ongoing implementation of this trial, shaping our approach in ways consistent with type 2 effectiveness-implementation hybrid designs (Bernet et al., 2013). These findings guided adaptations in implementation to enhance recruitment of less protected youth and to augment the alcohol misuse preventative elements. In response, intervention reach and alcohol protective effects increased in later wait listed communities. Despite this, overall study findings produced small effects among a quarter of the young people it enrolled. While this is notable as population level change, continued efforts to maximize Qungasvik intervention reach and effects are needed.

Limitations also link to strengths of the current approach. Centering of time to individual start date and the flexibility of multilevel modeling to accommodate different time points across individuals and communities may have diminished some of the precision in the estimates produced through the analysis. However, the intent of this trial was to test a community intervention as it would actually be practiced in *Yup'ik* communities. Accordingly, its design accommodated strong *Yup'ik* cultural values in a social connectedness that emphasizes respect for personal autonomy. This allowed individual youth choice in which intervention activities to attend as well as when to start the intervention, community choice in the intervention activities to deliver, and responsiveness to community differences in capacities to mount intervention.

Further, a recent systematic review (Pham et al., 2021) noted only two AIAN suicide prevention programs were evaluated by more than one outcome study, and only Qungasvik consistently produced positive outcomes. In addition to developing a culturally commensurate intervention, the Qungasvik team made a methodologically based decision to not pursue designs that risk underpowered testing, and to instead use methods more appropriate to small populations that were acceptable to communities. We respectfully disagree with this systematic review recommendations that research focus on (a) experimentally controlled outcome studies that (b) measure suicidal behaviors. We instead advocate for a methodological pluralism of rigorous approaches to advance AIAN suicide prevention. Assumptions the experimental control afforded by an randomized controlled trial (RCT) is uniformly suitable to all contexts risks unintended consequences. A cluster RCT design would have encountered its own limitations. These include the unsustainable costs to adequately power the design across remote small populations, as well as differences across clusters composed from a fixed number of *Yup'ik* communities that could be randomized. These design constraints can privilege individual-based interventions that produce larger samples over small sample and community-level interventions with large societal impacts, while the implementation constraints can create underpowered studies and irreproducibility (Henry et al., 2015). An exclusive focus on suicidal behaviors precludes exploration of a promising protective factor framework offering better fit with many Indigenous cultural contexts and community priorities (Allen, Wexler, et al., 2022), along with measurement and statistical advantages with small populations (Allen et al., 2012; Allen, Rasmus, et al., 2021).

There is need for additional research to guide multilevel understanding of variables that buffer suicide and alcohol risk, and that promote general well-being in communities at heightened vulnerability. In response to expressed community priorities, there is added need for development and testing of augmentations to the Qungasvik intervention at the community level. Possibilities suggested by community members include enhancement of Tribal government functioning, training for service providers in Indigenous cultural knowledge, opportunities for access among young people to ceremony and other spiritual resources, land and place-based practices such as subsistence activities, and Indigenous language usage

(Wexler et al., 2020). This encourages innovation outside the range of activities typically associated with suicide and alcohol prevention, extending its possibilities to include tribal government leadership academies, more intensive collaborations with AN spiritual leaders, and a youth services infrastructure that includes access to land-based activities and Indigenous language in daily use.

AUTHOR CONTRIBUTIONS

James Allen conceptualized and designed the study; provided leadership for study implementation and intervention implementation; contributed to data analysis and data interpretation; and drafted the manuscript. Billy Charles participated in study conceptualization; served as a study coordinator; supervised intervention specialists; served as liaison to the communities; and contributed to the manuscript content. Carlotta Fok contributed to study design; data management; data analysis; and helped to draft the manuscript. KyungSook Lee contributed to data management; data analysis; and helped to draft the manuscript. Andrew Grogan-Kaylor contributed to data analysis; interpretation of data; and helped to draft the manuscript. Qungasvik Team provided leadership for study implementation; and contributed to data interpretation and manuscript content. Stacy Rasmus conceptualized and designed the study; provided leadership for study implementation and intervention implementation; contributed to data analysis and data interpretation; and helped to draft the manuscript. All authors provided critical feedback, and read and approved the final manuscript.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The manuscript's data will not be deposited.

ETHICS STATEMENT

The project was approved by the appropriate institutional and/or national research ethics committees including appropriate tribal authorities. This study was performed in accordance with the ethical standards as laid down in the

1964 Declaration of Helsinki and its later amendments. Informed consent was obtained for all individual participants in the study. Active informed consent was obtained from all parents of children, who then provided their assent.

QUNGASVIK TEAM

The current Qungasvik Team includes Simeon John, Jorene Joe, Yolanda Kelly, Cyndi Nation, Georgianna Ningeulook, Jennifer Nu, Mark Tucker, Abraham Rivers, Wybon Rivers, and Auna Stone. Other team members include numerous individuals, councils, groups, and past project staff that are recognized in Acknowledgments.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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