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ORIGINAL PAPER

Vida Sana: A Lifestyle Intervention for Uninsured, Predominantly Spanish-Speaking Immigrants Improves Metabolic Syndrome Indicators

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Abstract Metabolic syndrome is an increasingly common condition that can contribute to the development of type 2 diabetes and cardiovascular disease. 35 % of adults living in the United States meet the criteria for having metabolic syndrome, with that number being even higher in populations with health disparities. We describe a 'healthy lifestyles' program implemented at a free clinic serving a predominantly Hispanic cohort of low-income, uninsured individuals living in Providence, Rhode Island. The "*Vida Sana/Healthy Life*" (*Vida Sana*) program uses low literacy, language-appropriate materials and trained peers to educate participants about healthy lifestyles in a setting that also provided opportunities for social engagement. 192 of 126 (65.6 %) participants in *Vida Sana* completed 6 out of 8 sessions of the *Vida Sana* program over a 12-month period. At the completion of the program, nearly 90 % of *Vida Sana* participants showed an increase in their health literacy, and at least 60 % of participants decreased each of the risk factors (blood sugar, cholesterol, body mass index or waist circumference) associated with metabolic syndrome.

Keywords Health disparities · Uninsured · Life-style intervention · Metabolic syndrome · Diabetes · Diabetes prevention project

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Introduction

Metabolic syndrome is an increasingly common condition that can contribute to the development of type 2 diabetes (T2D) and cardiovascular disease [1]. Nearly 35 % of adults living in the United States in 2014 meet the criteria for having metabolic syndrome. When compared to patients without metabolic syndrome, these individuals are twice as likely to experience adverse cardiovascular events, and are four times as likely to develop T2D [2–4]. The risk factors for metabolic syndrome include hypertension, abdominal obesity, insulin resistance, elevated fasting glucose and triglycerides, and decreased high-density lipoprotein [5, 6]. Metabolic syndrome disproportionately affects populations with health disparities, and the social determinants that contribute to these disparities also contribute to the negative long-term outcomes that many patients with metabolic syndrome experience [6–11].

In Rhode Island, individuals experiencing health disparities primarily identify themselves as belonging to either an ethnic minority group and/or an immigrant population.

In fact, many of the estimated 25,000–35,000 undocumented immigrants living in Rhode Island are of Central and South American origin [12–15]. In addition to ethnicity and citizenship status, most patients from health disparities populations also report a low annual income as well as a lack of health insurance, either due to residency restrictions or matters of affordability. Furthermore, these individuals often experience linguistic barriers in clinical settings, which can significantly impact their health literacy and access to quality care and other health-related resources [11, 16, 17].

Clínica Esperanza/Hope Clinic (CEHC) is a free clinic that serves a predominantly Latino community in and around the Olneyville neighborhood of Providence, Rhode Island, where 41.1 % of family incomes fall below the federal poverty level and roughly 29 % of individuals are uninsured [12, 18]. The clinic's team of eight paid employees and over 200 healthcare volunteers serves this local community and an extended community of low-income, predominantly Spanish-speaking individuals who lack health insurance by providing free, culturally-attuned, linguistically-appropriate healthcare. In addition to offering traditional health services such as primary care and preventative screening, CEHC also offers health education, training for entry-level healthcare workers, and a number of different health education and prevention programs that allow CEHC patients to learn about healthier choices and work towards reducing their risk for chronic disease [12, 19].

The *Vida Sana/Healthy Life* (commonly referred to as *Vida Sana*) intervention is based on the tenets of social cognitive theory, a behavioral intervention model that has been recognized for its effectiveness in producing lasting change in similar populations with health disparities [6, 20, 21]. *Vida Sana* uses materials developed by Dr. Susan Oliverio, of the Institute for Education on Health and Research (http://www.thumbsupforhealth.org). Dr. Oliverio's "Thumbs Up!" metabolic syndrome workbook and associated presentation and discussion materials were specifically developed for low English proficiency populations. The program was further adapted by CEHC to be administered by peer educators known as Navegantes in conjunction with social activities that would reinforce the workbook material. The Navegantes are trained community health-workers who live in the communities that the Clinic's patients also live in, and represent similar ethnic backgrounds. In preparation for their role as peer educators, the Navegantes participated in an extensive 10-week training program that provided them with training in case management, community outreach, and health education specific to the curriculum of the program [21–23].

The Navegantes covered the contents of the Thumbs Up! metabolic syndrome workbooks during 2 h sessions, once per week, over 5 weeks, in a highly interactive "social club" that enabled participants to share their stories and participate in fun activities while learning about the basic nutrition and metabolic syndrome risk factors described in the workbook and presentation materials. The entire program spanned 8 weeks, during which time participants were screened for metabolic syndrome (at the initiation and close of the program), received the Thumbs Up! nutritional education and (during the 3 weeks following the close of the program) participated in health-focused social activities.

In this report, we provide an overview of the initial 12 months of the *Vida Sana/Healthy Life* program, report the results for the first 192 participants, describe the challenges associated with running the program, and identify plans for improvement. Based on the results described here, the *Vida Sana/Healthy Life* program appears to effectively reduce metabolic syndrome risk factors for participants who complete the majority of the sessions and may represent a low-cost alternative to other more intensive lifestyle intervention programs aiming to improve long-term health outcomes in health-disparities populations with linguistic barriers.

Methods

Vida Sana/Healthy Life Program Overview

The development of the *Vida Sana/Healthy Life* program was initially funded by the AMA Foundation (2012) and has subsequently been supported by the Rhode Island Department of Health (RI DOH, 2013–2014). With funding from the RI DOH, concurrent *Vida Sana* programs were established at three active sites during the twelve-month period reported here; some groups met at CEHC's clinic location, others met at the Gloria Dei Lutheran Church in downtown Providence as well as at the Open Table of Christ United Methodist Church in the Washington Park neighborhood of Providence. Over a twelve-month period, 13 groups completed the program, and of them, 11 were conducted primarily in Spanish. Program participants were provided with linguistically-appropriate educational materials that were written and illustrated in a manner that catered specifically to the needs of the average program participant. Participants met weekly for 2 h, for a total of 8 weeks. Upon completion of the program, participants were provided with an honorarium (between $10 and 40 for the 8 week program) to compensate for their time and travel. Program completion was defined as the attendance of at least six of the eight sessions, including at least one social session. At the close of the program, participants completed a follow-up health survey and provided

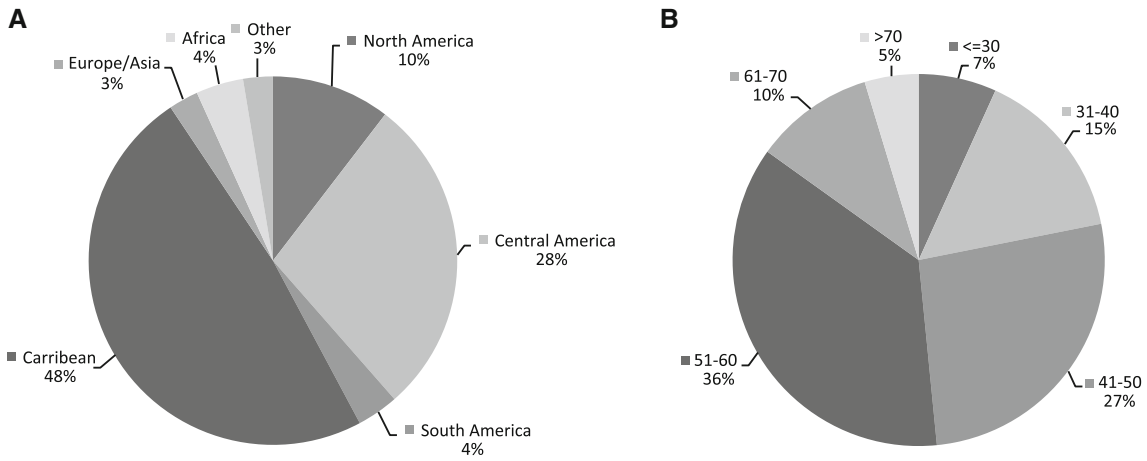

Fig. 1 Demographic information for *Vida Sana* Participants: **a** Region of origin of *Vida Sana* participants. **b** Age distribution of *Vida Sana* participants

Table 1 Demographic data of participants (n = 192)

	Number (%)
Age and gender	
Age (mean years)	49.8
Female	140 (73 %)
Continent/region of birth	
North America	20 (10 %)
Central America	54 (28 %)
South America	7 (4 %)
Caribbean	93 (48 %)
Europe/Asia	5 (3 %)
Africa	8 (4 %)
Other	5 (3 %)
Primary language	
Spanish	171 (89 %)
English	12 (6 %)
Creole	6 (3 %)
French	2 (1 %)
Portuguese	1 (1 %)

measurements of their weight, body mass index (BMI), blood glucose, low-density lipoprotein (LDL) cholesterol, waist circumference, and blood pressure. Participants were asked to follow up a month after the end of the program, although not all were available to do so.

Participants

Participants were recruited from either CEHC or from two other local community organizations (local churches). The programs were open to all interested individuals, although participants were primarily comprised of either current CEHC patients or individuals who were recruited during health screenings held at any of the three sites; individuals identified as either meeting the criteria for having metabolic syndrome or being at-risk for developing it, were informed about the program and invited to participate. Efforts were made to create groups of 10–15 individuals, equally representative of men and women from a variety of age groups, ranging from 16 to 79 years of age, although the median age of all participants was 51. While outreach personnel made a concerted effort to recruit an equal number of men and women, the majority of participants (73 %) were female. Similarly, enrollment was open to all, although the majority of participants were Hispanic, with 89 % speaking Spanish as their primary language. Only 5 % of participants were born in the United States. See Fig. 1 and Table 1 for graphical and tabular demographic data of the participants in the *Vida Sana* program.

Human Studies

The procedure for data analysis and the resulting report for publication were reviewed by the Ethical and Independent Review Services (E&I, Independence, Missouri) and qualified for exemption 4 as defined in 45 CFR46.101(b). Prior to initiating the *Vida Sana* program, participants provided consent to participate in the program and to have blood tests performed. All participants were assigned an identification code (ID code). During the 12 month period that was reviewed for this report, individual participant results were tabulated by participant ID code in a password protected Excel spreadsheet (no individual patient identifiers were included in the spreadsheet). An analysis of the project data was performed at the completion of the 12-month initial period of the project. Demographic information, health literacy assessment results, and

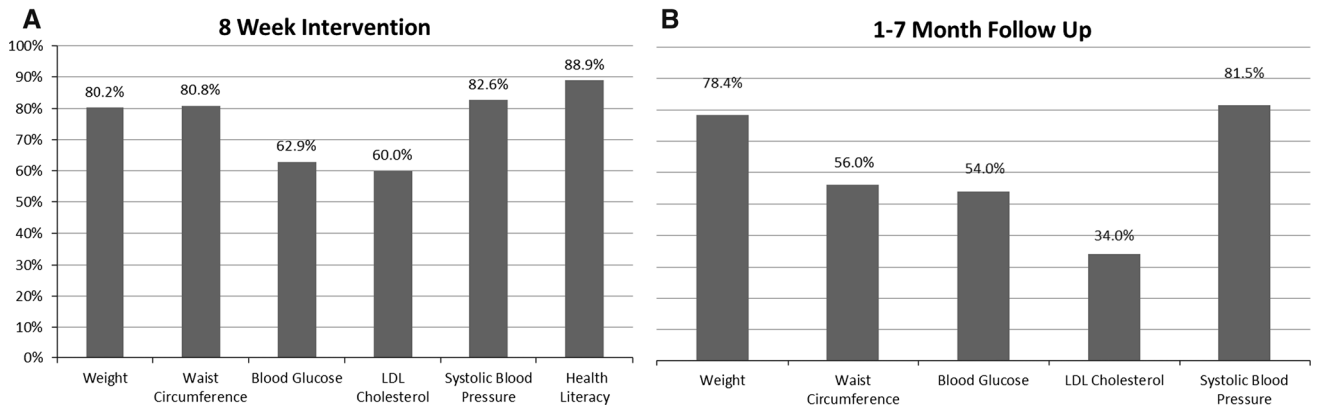

Fig. 2 Percent of *Vida Sana* population stable or improved for measured variables after: **a** the 8 week intervention and **b** the 1–7 month post-intervention follow up

metabolic outcome measures were inaccessible to non-program personnel.

Materials

All *Vida Sana* curriculum materials such as slides, books, and subsequent assessments were designed for the low-health literacy, low English-language proficiency subjects and information was presented using simple terminology accompanied by vivid photographs of individuals participating in healthy activities. The health literacy assessment was developed by Susan Oliverio (IEHR) who has experience designing educational materials for populations with low health literacy. The materials were provided to participants in either English or Spanish and all materials were written using simple (5th grade-level) language.

At the first visit, Navegantes administered a health literacy survey. The survey assessed participants' knowledge of chronic conditions such as T2D and cardiovascular disease, and also asked participants to provide insight into their understanding of nutrition and other lifestyle choices that might influence metabolic syndrome.

After completing the health literacy assessment, the Navegantes recorded the weight, BMI, blood glucose, LDL cholesterol, waist circumference, and blood pressure of all participants. During the first session and over the course of the next four meetings, the Navegantes used the *Vida Sana* curriculum materials to introduce the participants to topics related to health issues and lifestyle choices. The topics covered during the five didactic sessions were nutrition, T2D, cardiovascular disease, and methods of chronic diseases prevention and management. These five educational sessions (one per week) were followed by two social sessions which served to reinforce what participants had learned previously, and a final session that assessed the impact of the program on metabolic syndrome indicators. These meetings were characterized by social activities such as dance classes and health-literacy bingo. Previous program participants were frequently invited to discuss their experience with the program and their post-completion methods for living a healthy lifestyle.

During this last session, participants completed a follow-up health literacy assessment and had their metabolic risk factors re-measured. The final session also featured a 'graduation' and distribution of certificates of achievement. Those who completed the program were also given a small stipend that was based on the number of sessions completed (gift cards ranging from $10 to $40 dollars), a pedometer, and a booklet reinforcing the key elements of the program. Participants were encouraged to share their individual results with their healthcare providers and to discuss plans for continuing to reduce their metabolic risk factors.

Data Collection and Analysis

The student's *t* test for unpaired samples was used to compare the baseline metabolic characteristics of participants who ultimately completed the program to those who did not. The individual *Vida Sana* groups did not differ significantly in terms of outcomes, so the individual groups were pooled for the final analysis. Outcomes were measured by examining the percent changed for each category between the baseline and eight-week time point for individuals who participated in at least six out of the eight sessions.

Since participants had different starting points and goals for the program, outcomes were described as 'percent stable or improved' and 'percent and total amount changed' for each category. For example, some subjects were overweight and some were not, so not all subjects were trying to lose weight. Follow-up measurements were

Table 2 Changes in measured variables at 8 weeks

	Baseline, mean (SD)	8 weeks, mean (SD)	% Stable/ improved	Change for those that improved, mean (SD)
Weight (n = 126), lbs	180.0 (46.1)	176.4 (45.1)	80.2 %	−6.0 (5.2)
BMI (n = 126)	31.5 (7.7)	30.8 (7.5)	80.2 %	−1.1 (1.0)
Waist Circumference (n = 125), inches	38.7 (6.7)	37.8 (5.8)	80.8 %	−2.2 (1.5)
Blood Glucose (n = 124), mg/dl	123.2 (50.7)	115.8 (48.4)	62.9 %	−26.3 (27.5)
LDL Cholesterol (n = 125), mg/dl	190.6 (37.7)	185.4 (33.1)	60.0 %	−19.1 (16.8)
Systolic BP (> 120 onset) (n = 69), mmHg	139.1 (16.8)	133.5 (15.3)	82.6 %	−11.1 (9.5)
Health Literacy Test (n = 117)	72.1 % (21.4 %)	90.0 % (10.7 %)	88.9 %	+22.2 % (19.7 %)

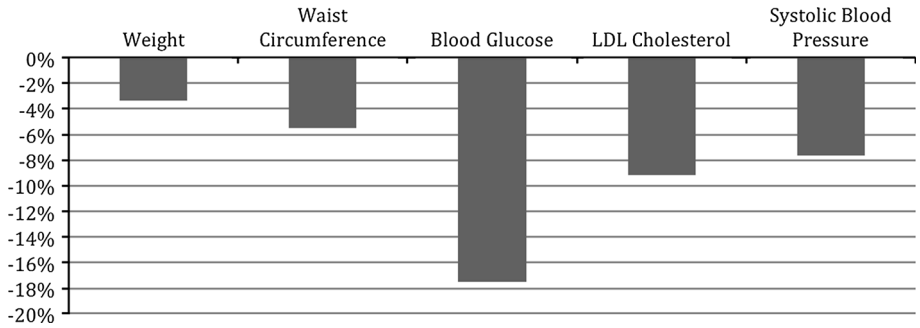

Fig. 3 Percent decrease of each metabolic variable for those participants who improved in variable at the 8 week follow up time point

gathered at time points ranging between one and seven months after completion. Follow-up data was analyzed in a similar fashion to 8-week data, examining the numbers of participants who remained stable or improved between their completion and follow-up date, and how much those that improved changed in that time.

Results

Over the twelve-month period reported here, 192 individuals participated in the 13 longitudinal eight-week programs. Of these participants, 126 (65.6 %) completed the program (defined as having participated in at least six of eight *Vida Sana* sessions). Program outcomes were determined for those who completed the program. Across all metabolic factors, more than 60 % of participants showed improvement in one or more measures, and nearly 90 % demonstrated improved health literacy. The eight-week and follow-up changes in metabolic outcomes and health literacy are shown in Fig. 2; changes in eight-week measurements are described in Table 2 and percent decrease in metabolic factors for those who improved after eight weeks is shown in Fig. 3.

Because participants with a baseline systolic blood pressure of 120 mmHg or lower are considered to be within a healthy range, only participants whose baseline systolic blood pressure was greater than 120 mmHg were counted in the blood pressure calculation. Out of the total 192 participants, 69 individuals (36 %) had elevated blood pressure at program outset, and of those, 83 % demonstrated an improved systolic blood pressure. Blood glucose measurements were not always performed when the patients were fasting. However, non-fasting ("random") glucose levels improved for 63 % of participants.

At the onset of the program, 54 % of participants were considered to be obese (BMI of 30 or greater), and at the close of the eight-week program, the rate of obesity among all participants decreased to 46.0 %. The percentage of participants who met the criteria for abdominal obesity (waist circumference >35 inches for women and >40 inches for men) was reduced from 68 to 62 %.

Of the 126 individuals who completed the program, 51 (41 %) completed a follow-up session one to seven months after the close of their session; metabolic factors consistently improved or remained stable in participants throughout the range of follow-up times. In all cases, risk factors for metabolic syndrome were reduced by a minimum of 34 %, with the most significant continued improvement being to participants' systolic blood pressure, with 82 % follow-up individuals reporting an average reading of 127.8. Table 3 shows metabolic outcomes

Table 3 Changes in metabolic variables at 1–7 month follow-up

	8 weeks, mean (SD)	Follow up, mean (SD)	% stable/ improved	Change for those that improved, mean (SD)
Weight (n = 51), lbs	178.5 (58.1)	174.6 (52.7)	78.4	−9.2 (18.2)
BMI (n = 51)	30.8 (8.8)	30.2 (7.9)	78.4	−1.6 (3.0)
Waist circumference (n = 50), in	37.4 (6.3)	37.4 (6.2)	56.0	−2.0 (1.5)
Blood glucose (n = 50), mg/dl	122.6 (48.4)	125.3 (49.7)	54.0	−30.5 (34.7)
LDL cholesterol (n = 50), mg/dl	187.9 (36.4)	198.5 (36.9)	34.0	−14.8 (29.6)
Systolic BP (>120 onset) (n = 27), mmHg	133.3 (14.3)	127.8 (13.5)	81.5	−14.9 (8.1)

between the end of the program and the follow-up measurement for these participants.

Discussion

During the 12 month *Vida Sana* program report period, at least 60 % of participants demonstrated stability or improvement after the eight-week intervention in each of the measured outcomes, including weight, waist circumference, random blood glucose, LDL cholesterol, and blood pressure. The average participant experienced a 3.7-pound weight loss (a reduction of 2.0 % from baseline), which correlated with an average BMI decrease of 0.7 kg/m^2, from 31.5 to 30.8. The average waist circumference decreased by nearly one inch (0.9 inches). Participants decreased their random blood glucose and LDL cholesterol by 7.4 and 5.2 mg/dl, on average, respectively. Of those participants with a systolic blood pressure greater than 120 mmHg at baseline, the average change was a decrease of 5.6 mmHg. With respect to the health literacy assessment, the average pre-assessment score was 72.1 %, and the average follow up assessment was 90.0 %, with approximately 83 % of participants improving their health literacy status.

Overall, the *Vida Sana* intervention program had a positive impact on measured metabolic syndrome indicators during the 12 months reported here. Several limitations to this report are worth noting. Participation in the program was not randomized, and there was no comparison group. It is not possible to determine which of the components of the program (low English proficiency curriculum, interactive sessions, or nutritional information) most strongly influenced the outcomes. The short program period also served as a limiting factor in collecting data, since the eight-week timeframe did not provide a long enough period to observe significant changes in metabolic risk factors. Blood glucose measurements were not performed after fasting, since the program was designed to be convenient to the participants and the sessions usually took place at the end of the day. Therefore, the blood sugar results were variable and not statistically rigorous, but were nevertheless included in the results. Random blood glucose measurements have been found to provide a fairly reliable correlation to glycemic control [24].

Funding for the program was also a significant limitation, since the number of hours that Navegantes could devote to planning, preparation, and instruction was limited. Limited financial resources also affected the extra benefits participants received such as incentives and the type of food provided to participants during sessions. Participation rates might also have been higher had the program included on-site childcare.

Despite these limitations, however, the results are comparable to a more comprehensive lifestyle interventions, which usually require intensive participation over a six-month period [6, 21–23, 25]. At the end of the intervention, the average *Vida Sana* participant had lost nearly four pounds of body weight, while the average weight change observed in three other lifestyle intervention studies was a loss of two to seven pounds [6, 21, 23]. The average change in waist circumference after the eight-week *Vida Sana* intervention was a decrease of 0.9 inches, whereas the average change reported for two other lifestyle studies was a decrease of 0.5–2.5 inches [23, 25]. The average change in LDL cholesterol after the eight-week *Vida Sana* intervention was a decrease of 5 mg/dl, compared to a decrease of 13 mg/dl for participants in another intervention, which focused on culturally-appropriate health education for Spanish-speaking individuals [20]. Few comparable intervention programs measured a difference in health literacy; therefore, we are only able to compare results to one other study: 82.9 % of *Vida Sana* participants demonstrated improvements in health literacy, while Spanish-speaking participants in another study showed a 69 % improvement rate [20]. Other programs using similar health-literacy tests reported seeing comparable increases in test scores and attributed some of the

metabolic improvements observed in participants to these gains in health literacy [6, 22, 25].

None of these results from the *Vida Sana* program or from other interventions in health-disparities populations were as successful as those observed by the Diabetes Prevention Program (DPP) Research Group, which was well funded, intensive, and included participants who were from a substantially different socioeconomic population. Participants in the DPP achieved a weight loss of approximately 15 pounds and a net reduction in fasting blood glucose of 4 mg/dl at the six-month time point [26]. After the 2.8-year study, there was 58 % reduction in the incidence of diabetes for the lifestyle-intervention group compared with placebo [26]. Other lifestyle-intervention programs in general community settings have been shown to decrease weight and other metabolic risk factors but have not been as successful as the DPP study [27–30].

Future Directions

Limitations on funding made it difficult to obtain additional validation of the impact of the *Vida Sana* program. Future iterations of this program will include glycated hemoglobin (HbA1c), and emphasize the importance of obtaining fasting blood glucose readings. *Vida Sana* peer educators will also encourage participants to set manageable goals and to provide healthy snacks at program meetings. Supplemental exercise programs will also be made available to *Vida Sana* participants. Volunteer-run childcare services will also be provided to improve the participant retention rate.

By focusing on a community-based model of culturally-sensitive, linguistically-appropriate health education, the *Vida Sana/Healthy Life* program has produced promising results during the twelve-months of the program reported here, and compares well with other similar programs. This demonstrates the feasibility of shorter duration peer-led healthy lifestyle intervention programs to reduce chronic diseases risk factors related to metabolic syndrome in health-disparities populations, and demonstrates the efficacy of a social cognitive theory-based approach.

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Conflict of interest The authors report no conflicts of interest.

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