

Contractor's Report to the Board

Community Based Social Marketing Pilot to Increase Do- It-Yourself Oil Recycling Rates

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Executive Summary

CIWMB grantees spend a significant percentage of their Used Oil grant funds each year on mass media advertising to promote used oil recycling to the public. However, research has shown that, while mass media advertising raises public awareness of environmentally beneficial behaviors, it generally does not increase public adoption of those behaviors. Community Based Social Marketing (CBSM), on the other hand, has successfully increased public participation in a number of environmentally beneficial behaviors.

To determine if CBSM can increase used oil and filter recycling by Do-It-Yourself oil change mechanics (DIYers), in 2003 the CIWMB contracted with the California State University, San Marcos (CSUSM) to conduct CBSM test pilots in Los Angeles, Napa and Madera Counties. In both the L.A. and Napa County pilots, CBSM produced significant, measurable increases in the volume of used oil recycled. The Madera County pilot indicated that distribution of incentives increases DIYers' intent to recycle their used oil and filters whereas distribution of informational brochures does not.

CSUSM Professor of Psychology Wesley Schultz, in conjunction with the Los Angeles, Napa, and Madera County used oil recycling coordinators, developed a different CBSM pilot in each region to address their unique barriers. Below is a summary of the pilot results.

Los Angeles County

Identified Barrier: DIYers reported being turned away from CCCs because they lacked proper collection containers

CBSM Intervention Strategy: Distribute free oil collection containers affixed with motivational prompts to DIYers at auto parts stores

1,468 customers received free oil collection containers containing the standard CIWMB "Recycle Used Oil and Filters" sticker at 4 Kragen Auto Parts stores. Another 1,476 customers received free oil collection containers affixed with a motivational "Take the Last Step" sticker at an additional 4 Kragen stores. A control group of customers at another 8 Kragen stores received no collection containers. **During the quarter following the intervention, the Kragen stores that had distributed containers with the motivational "Last Step" sticker experienced a 22% increase in the volume of oil collected, as compared to the control group. Stores that had distributed containers with the standard CIWMB sticker experienced a 6% increase in volume of oil collected, as compared to the control group.**

Napa County

Identified Barriers: The majority of surveyed DIY residents did not know enough about the county's curbside oil recycling program or were not motivated enough to use it. Many also believed that their fellow DIY residents infrequently recycled their used oil.

CBSM Intervention Strategy: Send residents informational curbside program

enrollment mailers containing testimonials from community role models about the value of the program

Napa County contained 1,026 DIY households that could potentially utilize the curbside oil program but only 339 of these were enrolled in the program. The contractor and used oil coordinator re-designed direct mail brochures to better inform and motivate DIY residents to participate in Napa County's curbside oil collection program. The brochures contained program enrollment procedures and testimonials from several respected and well known Napa residents, accompanied by their photographs, proclaiming their valued use of the county's curbside oil collection service.

In Area A, brochures sent to residents included a call-in curbside oil enrollment number and in Area B they contained a mail-in curbside oil enrollment card. Residents in both areas received a follow-up postcard reminding them of Napa's curbside oil collection service. **The mailers resulted in a 22% increase in curbside oil enrollment in Area A (15 new program participants) and a 45% increase in Area B (25 new participants). Enrollment remained the same in control areas where no mailers were sent. Even more impressive was a 248% increase in the number of curbside oil pick-ups in the month immediately following the intervention.**

Madera County

Identified Barriers: Lack of DIY commitment to recycle used oil; no oil collection centers in unincorporated portion of county

CBSM Intervention Strategies: Distribute oil funnels affixed with commitment pledge stickers to DIYers and recruit new CCCs in unincorporated areas of county

Commitment Stickers: The ten CCCs in Madera County were underutilized. The pilot consisted of giving DIY customers exiting a Napa Auto Parts CCC one of three incentive packets to determine which would most motivate them to recycle used oil. The three packets consisted of: 1) a \$5 gift certificate and used oil recycling brochure (the control group); 2) a \$5 gift certificate, the brochure, and an oil funnel; or 3) a \$5 gift certificate, the brochure, and an oil funnel affixed with an oil recycling pledge sticker. One month after the intervention, of the DIYers who received packet #1, 6% reported improper disposal and 22% reported recycling their oil at a CCC. In contrast, of those who received packet #2, 0% reported improper disposal and 40% reported recycling their oil at a CCC. Of those who received packet #3, 0% reported improper disposal and 37% reported recycling their oil at a CCC. **These results indicate that receiving a free funnel increased DIYers reported intent to recycle their used oil but the additional pledge sticker did not further increase this intent level.**

CCC Recruitment: Madera County's 10 CCCs were all clustered in one area and the rest of the county did not have nearby access to an oil/filter collection center. To fill this gap in service, the contractor contacted 46 potential CCCs in the county, of which 12 were receptive to receiving more information about the CIWMB oil collection center certification process. A trained researcher visited each of the 12, presenting them with a certification information packet

that described the steps to becoming a CCC. None of the 12 opted to become CCCs for a variety of reasons including: liability of spilled oil or leaking tanks; insufficient room for an oil collection tank; fear of orphan oil being left outside during non-business hours; additional labor costs associated with being a CCC; unwanted government inspection of their business site. **This outcome indicates that adding CCCs in underserved rural areas is a difficult task, and grantees might want to explore alternative collection methods in these areas.**

Introduction

The improper disposal of used motor oil has been a longstanding issue in California, and nationwide. Used oil contains a range of contaminants, including lead, magnesium, copper, zinc, chromium, arsenic, chlorides, cadmium, and chlorinated compounds. Oil that is disposed of improperly can work its way into ground and surface waters and cause serious pollution. One gallon of used oil can contaminate thousands of gallons of drinking water, and Federal reports indicate that used motor oil accounts for more than 40 percent of the total oil pollution of our nation's harbors and waterways (CIWMB, 2003). As a result, the California Integrated Waste Management Board (CIWMB) has awarded numerous grants and contracts for research on oil recycling. While most of these funds have been used to support statewide recycling infrastructure and programs at the county level, new funds have recently been directed toward the behavioral aspects of oil recycling. The present contract is a pilot study for the implementation of Community Based Social Marketing (CBSM) interventions designed to increase oil recycling among people that change their own motor oil (do-it-yourselfers, or DIYers).

CBSM involves a four-step approach to fostering sustainable behavior change (McKenzie-Mohr, 2002; McKenzie-Mohr & Smith, 1999). These four steps are:

1. Identifying the barriers to a targeted behavior.
2. Using behavior change tools to overcome the barriers.
3. Piloting the selected tools using empirical research methodology and a control group.
4. Evaluation of the project once it has been widely implemented.

CBSM also draws heavily on the social psychological research literature to identify tools for overcoming barriers. These tools include: providing normative information, using commitment and consistency, and using the norm of reciprocity. This report summarizes a set of three CBSM interventions that were conducted in diverse counties across California: Los Angeles, Madera, and Napa. The counties were selected by CIWMB staff to provide a rural (Madera), urban (Los Angeles), and suburban (Napa) context for our CBSM interventions. In each of the counties, we followed the four-step CBSM approach.

Los Angeles

The oil recycling program in Los Angeles consists of over 600 certified oil collection centers and weekly special collection events. Collection centers only accept used oil for recycling if it is stored in a proper container. Response to the program has been good, but people are often turned away due to contaminated or improperly stored oil. Los Angeles County is a large and ethnically diverse region, with an estimated 1.9 million DIYers, generating nearly 2 million gallons of used oil per year.* The existing program places considerable emphasis on education. Information with procedural information about oil recycling has been distributed through fliers, radio, television, and billboard ads, and there is interest in finding a celebrity spokesperson.

* These estimates are based on U.S. Census data showing a 2003 population of 10 million people residing in Los Angeles County, and prior estimates of a 19% DIY rate, an average of 6.7 oil changes per year for the average DIY, and an average of 1.25 gallons per oil change.

Madera

The DIY oil recycling program in Madera County is channeled through its 10 certified collection centers. These collection centers will accept only uncontaminated oil returned in a proper container. Special collection events are also promoted, but are not well attended. Madera is a large rural county, with a population of 133,463 and an estimated 25,358 DIYers, generating an estimated 217,212 gallons of used oil per year. Prior interventions in Madera County have focused on making information about the program available to residents. Information pamphlets have been distributed at public events, such as the Madera County Fair. The City of Madera has published ads in local-area newspapers to promote the local collection centers. Prior to our CBSM study, no evaluations of DIYers in Madera, the existing program, or any of the various interventions designed to promote oil recycling, had been conducted.

Napa

The DIY oil collection program in Napa County includes 20 oil collection centers spread across the county, and a curbside collection option offered to ~5,400 households in the Upper Valley region. To utilize the curbside program, the resident must call Upper Valley Disposal Service (UVDS) to obtain an oil-recycling container and to schedule an oil pick-up. UVDS picks up the full container and leaves an empty one. Used oil is also accepted at the Permanent Household Hazardous Waste Collection Facility and at one-day collection events. Napa county is a rural / suburban community, with an estimated 25,000 DIYers generating 209,375 gallons of used oil. The reported CBSM intervention focused on residents served by the curbside collection program.

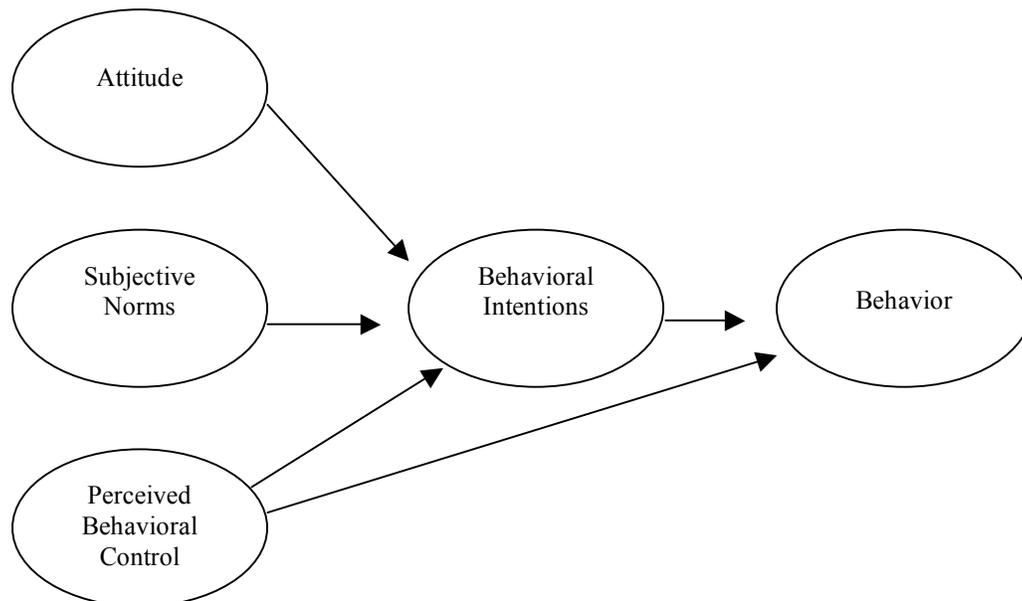
In the first section of this report, we summarize the methods and results of a phone survey that was designed to identify the barriers to oil recycling among DIYers in Madera County and Napa County. The ultimate goal of this project was to increase oil recycling rates in Los Angeles, Madera, and Napa counties, and identifying the barriers is the first step toward achieving this goal. Because there was sufficient existing data in L.A. County regarding the barriers to used oil recycling, additional survey data was not collected and we proceeded to design an intervention. In the second section of this report, we present a summary of the interventions that were designed to overcome the barriers to oil recycling in each of the three counties. In the third section, we summarize our findings and make recommendations about the effectiveness of Community-Based Social Marketing as a tool to increase the proper disposal of used motor oil among DIYers.

A Survey of the Barriers to Oil Recycling

One of the cornerstones of the four-step CBSM approach is the identification of barriers that prevent people from participating in the behavior of interest. Barriers can be both structural and psychological. Examples of structural barriers include lack of a program, limited hours of operation, or the need for special storage containers. Psychological barriers might include lack of knowledge, unfavorable attitude toward the behavior or the program, or lack of motivation. The first section of this report summarizes the methods and findings of a phone survey that was designed to identify the barriers to oil recycling among DIYers in both Madera and Napa County. The survey provides behavioral information about oil recycling and is useful in selecting potential points of intervention. In Los Angeles County, existing data was used to identify the barriers and develop the intervention, so no new survey data was required.

To better understand oil recycling behavior among DIYers, we have selected an integrative model from prior psychological research: the Theory of Planned Behavior. According to this theory, human action is guided by three kinds of considerations: beliefs about the likely outcomes of the behavior and evaluations of these outcomes (**attitude**), beliefs about the normative expectations of others and motivation to comply with these expectations (**subjective norms**), and beliefs about the presence of factors that may facilitate or impede performance of the behavior and the perceived power of these factors (**perceived behavioral control**) (Ajzen, 2002; Ajzen & Fishbein, 1980, 2000). By including questions in the phone survey that measured these factors, we were able to test the extent to which the behavior of oil recycling fits this model. A graphical representation of the model is presented in Figure 1 below.

Figure 1: *The Theory of Planned Behavior*



Methodology

Survey data were collected with the collaboration of the Social and Behavioral Research Institute (SBRI) at California State University San Marcos. Survey items were developed, pilot tested, and revised to generate a coherent set of items to measure perceived barriers, attitudes, normative beliefs, and behavior related to used motor oil recycling among DIYers.

Sample Design

The goal was to conduct interviews with a representative sample of 500 adult residents in each of two counties (Madera and Napa). A sample size of 500 was selected in order to provide for a useable number of DIYers in each county. Data from previous random-digit-dialing samples of Californians has indicated that statewide, 19% of households change their own oil. A sample of 500 provides for an anticipated sample of 95 DIYers in each county—a sufficiently large sample to identify the barriers to oil recycling.

We used a stratified random sampling approach to meet this goal. Implementation of the sample design was carried out using Computer-Assisted Telephone Interviewing (CATI) software. CATI implements stratified sample designs by tabulating counts of completed interviews for each county, and then using these counts to remove sample records from use once the target number of interviews for each region is reached. This ensures that the correct number of interviews will be collected for each region and reduces the number of unproductive calls made by the interviewing staff.

Data Collection

Telephone interviewing commenced on August 28, 2003 and concluded on September 29, 2003. All telephone calls were made from the SBRI Survey Lab, located in Suite 140 of the San Marcos City Hall, near the CSUSM campus. Telephone calls were generally placed from 9:00 a.m. to 9:00 p.m., Monday through Saturday. All telephone calls were made under the guidance of SBRI supervisory staff. SBRI's supervisory staff conducted on-line monitoring of survey calls throughout the project, both to verify the validity of the calls and for quality control purposes. An initial random sample of 6,501 random phone numbers was selected from the two counties, and 6.28 calls were made to each number in order to achieve the current sample.

Materials

The survey items were developed to cover four main issues: (1) self-reported rates of oil recycling, (2) self-identified barriers to oil recycling, (3) attitudes, normative beliefs, perceived behavioral control, and behavioral intentions regarding used oil recycling, and (4) knowledge and sources of information about recycling used motor oil. These four sets of questions were developed for collection sites (both retail and nonretail) and curbside oil collection programs (only available in Napa). The specific items included in the survey are shown in Appendix A.

(1) **Self-reported rates of oil recycling** were obtained through four questions. Respondents were first asked, "Who changes the oil on your cars?" to identify DIYers. Among DIYers, the survey proceeded by asking, "What options are available for disposing of used motor oil in your community?" Separate items were administered for respondents who indicated that a

collection center was available and those who identified curbside collection as an option. “When you change the oil on your car yourself, how often do you put your used motor oil out for curbside collection?” Similarly, “When you change the oil on your car yourself, how often do you take your used motor oil to an oil collection center?” Finally, participants were asked, “the last time you changed your oil, how did you dispose of your used motor oil?” The question was open ended, and responses were coded into discrete categories.

(2) The survey included items to measure **perceived barriers to oil recycling**. The items asked “What barriers do you see that might prevent people like yourself from taking their oil to a collection center?” and “What barriers do you see that might prevent people like yourself from using the curbside used oil collection program?” The questions were open-ended, and responses were coded into discrete categories.

(3) The survey contained a series of items developed to measure the four components of the Theory of Planned Behavior: attitudes, subjective norms, perceived behavioral control, and behavioral intentions. **Attitudes** were measured with two items: “Using a scale of one to five, where one equals unimportant and five equals important, how would you describe the oil collection program?” and “Using a scale from one to five, where one equals inappropriate and five equals appropriate, how would you describe the oil collection program?” Item anchors (important – unimportant; appropriate – inappropriate) were randomized across respondents. **Subjective norms** were measured with two items: “How often do you think other people you know take their used oil to an oil collection center?” and “Using a scale of one to five, where one equals uncommon and five equals common, how would you describe the oil collection program?” **Perceived behavioral control** was measured using an item that asked, “Using a scale from one to five, where one equals difficult and five equals easy, how would you describe the oil collection program?” Finally, **behavioral intentions** were measured with an item that asked, “The next time you change the oil on your car, how likely is it that you will take your used oil to a collection center?” A comparable set of items was developed for the curbside collection respondents (see Appendix A).

(4) The survey contained items developed to measure **knowledge** about the curbside oil collection program (if available to them), as well as sources of information about the programs available in their community. Knowledge was measured by asking participants, “Can you tell me the procedure for using your curbside used oil collection program?” Open-ended responses were coded into discrete categories. All respondents were asked, “In the past year, have you seen or read any information about recycling used motor oil?” For respondents who stated “yes,” they were asked to identify “your source of information for recycling used motor oil” and responses to the open-ended question were coded into discrete categories.

(5) Lastly, relevant demographic information was obtained. Measures included postal code, home ownership, years at current residence, age, ethnicity, education, and income.

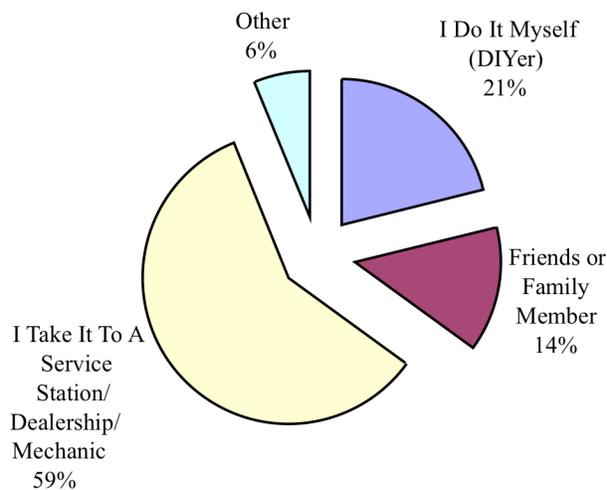
Findings

The data from the initial sample was analyzed descriptively and correlationally. The data were first analyzed separately by county, and then in aggregate.

Resulting Sample

Useable data were obtained from 1,011 respondents, 502 in Madera and 509 in Napa County. Of these, 220 (21%) were identified as DIYers.

Figure 2: “Who changes the oil in your car(s)” (Q3)



Of the 220 DIYers, 86% were men and 14% were women; 65% were White, 16% were Hispanic/Latino, 3% were Asian, 3% were Native American, and 12% were “other” or refused to answer. The median level of education was “Some College”, the median household income was \$35,000 - \$50,000, and the median age was 44. The mean number of oil changes per year was 4.21 ($SD=3.50$) with a range from 1 to 30. Among the DIYers, 58% owned their own home, and the average tenure at their current address was 11 years. These results, along with comparable census 2000 data, and a breakdown by county are shown in Table 1.

The sample was drawn from marketing regions, and did not correspond precisely to U.S. postal code. The Napa sample was obtained to cover those communities served by the curbside collection program, and was comprised primarily of numbers from 94515 (29%), 94508 (27%), 94574 (22%), 94567 (7%), and a small smattering from surrounding areas. The Madera sample was comprised of 93638 (36%), 93637 (32%), 93644 (13%), 93610 (9%), and 93614 (8%).

Table 1: *Demographic characteristics of DIYers in Napa County, Madera County, and Comparison to 2000 Census Data*

	Total Survey (N=220)	Napa County (N=95)	Madera County (N=125)	Census 2000 (California)
DIYer (%)	22%	18.7%	24.9%	19%
Gender (% male)	86%	83%	88%	50%
Ethnicity				
White (%)	65%	77%	68%	48%
Hispanic	16%	10%	24%	32%
Asian	3%	7%	1%	11%
African American	2%	1%	2%	7%
Income (median)	\$42,500	\$62,500	\$42,500	\$47,493
Age (median)	44	45	42	33
Homeowner (%)	58%	60%	57%	57%

Note: The 19% DIY rate was obtained from a statewide survey funded by the CIWMB. The DIY rate shown is for respondents who indicated that in the past year, they had personally changed the oil on a car. This percentage is different from Figure 1 due to multiple methods reported for method of oil change. Surprisingly, there was very little overlap, and only 30 (14%) of DIYers also reported using a service station.

Disposal of Used Motor Oil

The sample of 220 DIYers was asked, “Can you tell me what options are available for disposing of used motor oil in your community?” The question was asked in an open-ended format, and responses were coded into five categories: curbside collection, certified collection site at a local store, another collection site (not retail), special collection event, and other. Multiple responses were allowed, so the total exceeded 220. Of the total sample, 23 mentioned curbside collection, 109 mentioned a retail collection site, 76 mentioned a non-retail collection site, 16 mentioned a special collection event, and 16 responses were coded as “other.” The “other” responses in Madera included taking it to the dump, a storage container at work, and burning it. In Napa, other responses included taking it to the landfill and a storage container at work. These responses are shown in Table 2.

Table 2: *Percentage of Respondents Listing Each Type of Disposal Method Available in Their Community*

	Total sample (N=220)	Madera County (N=125)	Napa County (N=95)
Collection site (retail)	50%	60%	36%
Collection site (not retail)	35%	22%	50%
Curbside collection	10%	7%	15%
Special collection event	7%	6%	10%
Other	7%	8%	6%

There was considerable variation across the two counties. In Madera County, the primary method for disposing of used motor oil was a retail collection site, followed by a nonretail collection site. Interestingly, 9 (7%) respondents from Madera listed curbside collection as an option for disposal, but no formal curbside collection program is available anywhere in the county. For Napa County, the most frequently mentioned disposal method was a nonretail collection center (50%), followed by a retail collection center (36%), and finally curbside collection (15%).

Respondents were asked to indicate their method of oil disposal “the last time you changed your oil.” The question was asked in an open-ended format, and responses were coded into 7 categories: Throw it in the trash, pour it down a drain, pour it on the ground, keep it in a container at home, certified collection site (retail), another collection site (not retail), or curbside collection. The breakdown of responses across the sample, and separately by county is shown in Table 3.

Table 3: “The last time you changed your oil, how did you dispose of your used motor oil?”(Q8)

	Total sample (N=220)	Madera County (N=125)	Napa County (N=95)
Keep it in a container	12%	17%	5%
Collection center (retail)	41%	47%	33%
Collection center (not retail)	30%	19%	45%
Curbside collection	7%	4%	11%
Throw it in the trash	1%	1%	0%
Pour it down a drain	1%	1%	0%
Pour it on the ground	1%	2%	1%
Other	7%	9%	5%
TOTAL	100%	100%	100%

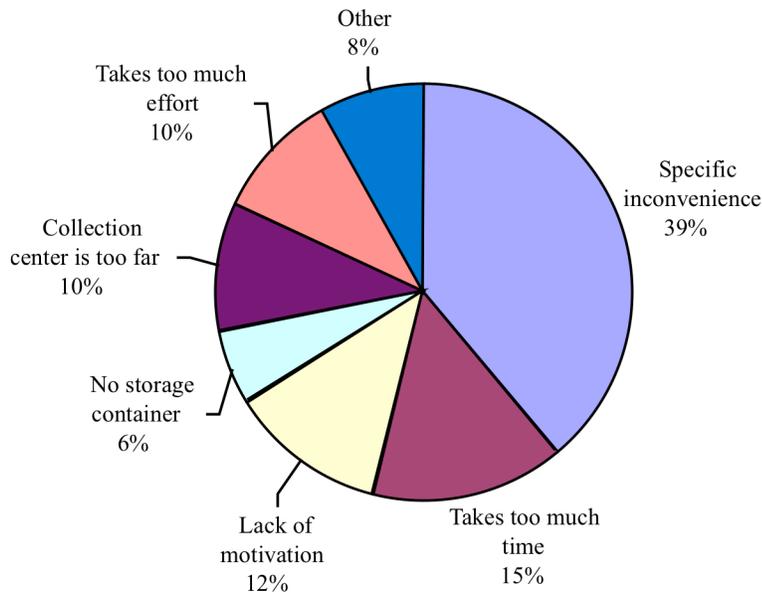
Improper disposal. The survey data affords an opportunity to estimate the amount of improper disposal by DIYers. A more detailed analysis of this issue was reported in a 2002 CIWMB report prepared by researchers at San Francisco State University. The SFSU data showed that 8% of respondents admitted to improper disposal, an additional 11% could not name a disposal facility or its location, and an additional 13% admitted failure to recycle oil at least once. Our 10% measure of self-reported improper disposal (trash, drain, ground, other) is similar to the SFSU 8% figure. In an additional study, we examined the social desirability of proper oil disposal by asking DIYers to report improper disposal separately under confidential and anonymous testing conditions. When asked confidentially, 7% reported improper disposal, and when asked anonymously, 13% reported improper disposal. See Appendix B for more details.

Perceived Barriers to Oil Recycling

Respondents were asked to indicate the perceived barriers to utilizing the oil collection programs available in their community. The question was asked in an open-ended format, and responses were coded into discrete categories. The data was analyzed separately by county.

Madera County. Only data from respondents who indicated that a collection center (either retail or nonretail) was available were analyzed. Among these respondents, the most frequently mentioned barrier was “specific inconvenience” (39%). Included in this category were: limited hours of operation (14%), messy (11%), not enough collection sites (8%), and likelihood of being turned away for improper storage (6%). Respondents also mentioned “takes too much time” (15%), lack of motivation (12%), lack of a good storage container (6%), the center is too far (10%), and takes too much effort (10%). Eight percent could not identify a barrier, and 5% could not be classified.

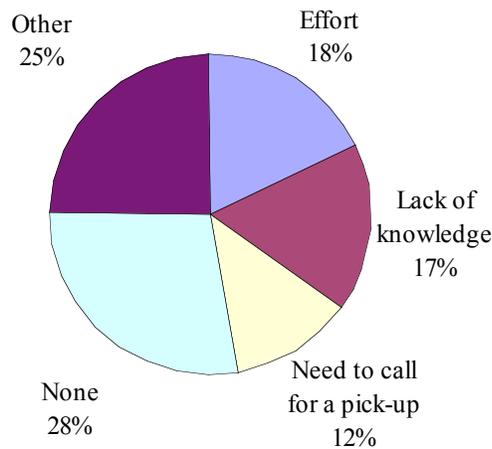
Figure 3: *Perceived Barriers to Oil Recycling – Madera County*



Napa County. In Napa County, the data from the curbside collection respondents, and those for collection centers were analyzed separately. For collection centers, respondents identified a number of barriers to recycling their used motor oil. The most often-cited barrier was a “specific inconvenience,” (35%) including limited hours (25%), and possibility of being turned away because collection site cannot accept more oil (10%). Respondents also listed: distance from home (18%), takes too much effort (20%), and takes too much time (7%). Several respondents listed more than one barrier, so the total exceeds 100%.

Of the Napa respondents, 56 were homeowners and lived in the regions served by Upper Valley Disposal; yet only 23 listed curbside collection as an option for used oil disposal. For the respondents who identified curbside collection as an option, identified barriers included: too much effort (18%), lack of knowledge about the program (17%), the need to call for a pick-up (12%), “other” (25%), and 28% could not identify a barrier. A graphical representation of the curbside responses is shown in Figure 4.

Figure 4: *Perceived Barriers to Curbside Oil Recycling – Napa County*



Theory of Planned Behavior

One of the goals of the barrier study was to test the relevance of the Theory of Planned Behavior to oil recycling among DIYers. The questionnaire included measures of attitudes, subjective norms, and perceived behavior control, as well as measures of behavioral intention and past behavior. Analyses were conducted separately by county.

Madera County. The focus in the Madera sample was on collection centers. Among the respondents, 87 indicated that they had a collection center available in their community. As shown in Table 4, respondents indicated that they used these centers regularly in the past (*Mean* score of 4.36 out of 5), and indicated that they planned to use these centers again the next time they changed their oil (*Mean* score of 3.63 out of 4). Attitudes (*Mean* = 4.52) were quite favorable toward oil recycling, but perceived behavior control (*Mean* = 3.78) and subjective norms (*Mean* = 3.85) were moderate to low. In essence, respondents had very favorable attitudes toward oil recycling, but perceived it to be moderately difficult, and had low normative beliefs.

Table 4: *Descriptive Results for Items Measuring Attitudes, Subjective Norms, Perceived Behavioral Control, Behavioral Intentions, and Past Behavior for Madera County Collection Centers*

Survey Items	Measure	N	Mean	SD
How important is the oil collection program (1=unimportant to 5=important)	Attitudes	87	4.52	.91
How easy is the oil collection program (1=difficult, 5=easy)	Perceived Behavioral Control	87	3.78	1.51
How often do you think other people you know take their used oil to an oil collection center? (1=never to 5=always)	Subjective Norms	87	3.85	1.41
The next time you change the oil in your car, how likely is it that you will take your used oil to a collection center? (1=very unlikely, 4=very likely)	Behavioral Intentions	87	3.63	.70
When you've changed the oil in your car, how often do you take your used motor oil to an oil collection center? (1=never to 5=always)	Self-Report Behavior	87	4.36	1.11
How many miles to the closest collection center?		84	9.39	11.63

The data were further analyzed to assess the correlations between the various components of the theory. According to the basic model, a person’s intention to act is the best determinant of his or her actual behavior (see Figure 1). The results from the responses summarized above indicate that intentions were only modestly correlated with behavior ($r=.25$). Furthermore, attitudes ($r=.10$) and perceived behavioral control ($r=.16$) were weakly correlated with intentions, while subjective norms ($r=.24$) were modestly correlated with intentions.

Napa County. The data from Napa County were analyzed separately for curbside and collection center programs. For the curbside collection, respondents showed a very favorable attitude (Mean = 4.13 out of 5), as well as a high degree of behavioral control (Mean = 4.43). Respondents reported using the program at a high level, and intended to use the program in the future. The lowest score with regard to the curbside program was normative beliefs. Despite the fact that respondents reported favorable attitudes about using the program, they believed that other people were less likely to do so (mean score of 3.16 out of a possible 5).

Table 5: *Descriptive Results for Items Measuring Attitudes, Subjective Norms, Perceived Behavioral Control, Behavioral Intentions, and Past Behavior for Napa County, Curbside Collection*

Survey Items	Measure	N	Mean	SD
How important is the oil collection program (1=unimportant to 5=important)	Attitude	23	4.13	1.55
How easy is the oil collection program (1=difficult, 5=easy)	Perceived Behavioral Control	23	4.43	1.24
How often do you think other people you know take their used oil to an oil collection center? (1=never to 5=always)	Subjective Norms	19	3.16	1.64
The next time you change the oil in your car, how likely is it that you will take your used oil to a collection center? (1=very unlikely, 4=very likely)	Behavioral Intentions	23	3.71	1.33
When you've changed the oil in your car, how often do you take your used motor oil to an oil collection center? (1=never to 5=always)	Self-Reported Behavior	23	3.21	1.84

Additional analyses examined the extent to which the Theory of Planned Behavior was appropriate for understanding curbside oil recycling. Correlational analyses showed that

intentions were strongly correlated with reported behavior ($r=.88$). Furthermore, attitudes ($r=.05$), subjective norms ($r=.40$) and perceived behavioral control ($r=.25$) were positive predictors of intention.

Analyses of the collection center data for Napa showed results similar to those obtained for Madera County. Napa respondents had favorable attitudes toward oil recycling ($Mean = 4.28$), but rated the collection centers as more difficult ($Mean = 3.92$) and reported low normative beliefs ($Mean = 3.60$). Respondents reported a high degree of intent to use the centers in the future ($Mean = 3.35$ out of 4). These results are shown in Table 6.

Table 6: *Descriptive Results for Items Measuring Attitudes, Subjective Norms, Perceived Behavioral Control, Behavioral Intentions, and Past Behavior for Napa County, Collection Centers*

Survey Items	Measure	N	Mean	SD
How important is the oil collection program (1=unimportant to 5=important)	Attitude	64	4.28	1.39
How easy is the oil collection program (1=difficult, 5=easy)	Perceived Behavioral Control	60	3.92	1.41
How often do you think other people you know take their used oil to an oil collection center? (1=never to 5=always)	Subjective Norms	55	3.60	1.40
The next time you change the oil in your car, how likely is it that you will take your used oil to a collection center? (1=very unlikely, 4=very likely)	Behavioral Intentions	63	3.35	1.12
When you've changed the oil in your car, how often do you take your used motor oil to an oil collection center? (1=never to 5=always)	Self-Reported Behavior	63	4.13	1.51
How many miles to the closest collection center?		60	7.20	9.28

Correlational analyses examined the relevance of the Theory of Planned Behavior to the collection center data. Consistent with the theory, results showed that intentions were strongly correlated with behavior ($r=.78$). However, attitudes ($r=.14$), subjective norms ($r=.12$), and perceived behavioral control ($r=.10$) were only slightly correlated with intention.

Knowledge and Sources of Information about Oil Recycling

The sample of 220 DIYers were asked whether they had “seen or read any information about recycling used motor oil in the past year.” Of the total sample, 106 reported seeing or reading such information. Of the 95 DIYers in Napa County, 48 (53%) reported exposure to such information, and of the 125 DIYers in Madera, 58 (47%) reported exposure.

In the Madera sample, 28% reported television, 22% newspaper, 10% radio, 9% public event, 9% billboard, and 32% reported “other.” These “other” responses included a brochure or billing insert (12%), a posted sign at the retail site (8%), word of mouth (4%), and 8% defied classification. Multiple responses were allowed, so the total exceeds 100%.

In the Napa sample, 29% reported newspaper, 23% reported a billing insert, 10% reported a billboard, 6% reported public event, 2% reported television, none (0%) reported radio, and 58% reported other. These other responses included a posted sign at the retail site, and word of mouth.

In the Napa sample, knowledge about the curbside collection program was assessed by asking respondents, “can you tell me the procedure for using your community curbside used oil collection program.” The question was asked in an open-ended format, and responses were coded into categories. Based on discussions with Napa County officials, we determined that there were three key elements to utilizing the program: call to request a container, put container at the curb for collection, and call the hauler to request pick-up. Of the curbside respondents, 44% mentioned putting the oil at the curb on trash day, 32% indicated that they must call to request a pick-up, and 28% indicated that they must use the designated container. Across these respondents, 28% reported none (or indicated that they didn’t know) of these elements, 48% reported one, 16% reported two, and 8% reported all three.

In analyzing the usage rate of the curbside program, we found that 33% of DIYers who were served by the collection program did not utilize it, and instead took their oil to a collection center (or otherwise disposed of it). Knowledge of the program was positively correlated with utilization ($r=.34$). Of the respondents who reported never using curbside collection, 61% could not name even one of three elements of the program.

Summary and Conclusions

The purpose of this survey was to identify the barriers to used oil recycling in two diverse counties in California. A random-digit-dialing telephone sampling procedure was used to obtain a sample of 1,011 residents in the two counties. Overall, the data showed a 21% DIY rate, which is slightly above the 19% estimate statewide. The DIY rate was higher in Madera County (25%) than in Napa County (19%). Demographic characteristics indicated that the modal DIYer is a White male, age 44, with a household income of \$42,500. There is also a sizeable number of Hispanic male DIYers, particularly in Madera County.

The majority of the respondents reported proper disposal of their used oil. When asked about the last time they changed their oil, 78% reported a proper disposal method (collection center or curbside collection), 12% reported storing it in their homes, and 10% reported an improper disposal method.

With regard to perceived barriers to oil recycling, the most commonly cited barrier was “inconvenience,” including lack of time, storage, and transportation requiring too much time. For

curbside collection in Napa, oil recycling was perceived to be considerably easier. In addition, respondents from Napa who reported the availability of curbside recycling were considerably more likely to recycle their oil ($M=3.71$) than respondents who only had access to collection centers ($M=3.35$). However, in Madera (where curbside is not an option), intentions to recycle used oil was nearly as high as that found for the Napa curbside respondents ($M=3.63$).

The survey also included items to test the usefulness of the Theory of Planned Behavior for understanding and promoting oil recycling. Analyses suggested that the theory did not perform particularly well with regard to usage of collection centers. In contrast, the theory worked particularly well in the area with curbside collection. This finding suggests that different psychological factors are associated with oil recycling through the two different collection methods. Our speculation is that there is considerable variation in the barriers across the collection centers, and that structural issues (distance, convenience, hours of operation, retail and nonretail) influence a person's intention to recycle oil more than psychological variables. In contrast, the structural issues associated with curbside collection in Napa County are fixed, and therefore psychological factors play a more prominent role.

The data from the barrier survey uncovered several possible points of intervention in Napa and Madera. However, it is important to note that in addition to identifying possible points of intervention, it also suggested places that are unlikely to produce behavior change. Across the sample, in both Napa and Madera, and for curbside and collection centers, respondents expressed favorable attitudes toward oil recycling and oil collection programs. It is unlikely that an intervention targeting these attitudes will produce a substantial change in oil recycling.

Madera. Oil recycling in Madera is rated as reasonably easy, and there is a general level of agreement that DIYers should recycle their oil. Based on these findings, we recommend an intervention designed to increase the commitment among DIYers to recycle their used oil, and to reinforce the habit among those who already do it. One technique that could be an effective tool in promoting recycling is commitment (Jellison & Mills, 1969; Pallak & Sullivan, 1979). **Commitment interventions** have been used in social psychological research with excellent success for nearly 40 years (DeLeon & Fuqua, 1995; Shippee & Gregory, 1982), across a variety of behavioral domains including recycling and energy conservation. In the subsequent section, we summarize a commitment intervention which could be implemented on a large scale.

Napa. Oil recycling in Napa County is divided into those communities served by a curbside collection program, and those served by collection centers. For the curbside collection program, the most logical target for an intervention is normative beliefs. While attitudes, behavioral control, and intentions are generally high, normative beliefs are low. There is general belief that other people recycle their oil infrequently, and this can be an important psychological barrier to oil recycling.

Furthermore, there is some evidence that a sizeable percentage of residents who are served by the curbside oil collection program, offered through Upper Valley Disposal, might be unaware of its existence, or otherwise choose not to use it. Thus, we recommend a direct mail campaign to residents served the curbside oil collection program. The intervention should target normative beliefs, but also provide information and promote awareness of the program. While the county has regularly disseminated informational brochures to residents who bring their oil to a special collection event, a direct-mail campaign will get information into the hands of residents who are not already engaged in the recycling behavior.

Targeting Barriers to Promote Proper Oil Disposal

Based on our review of existing data, research literature, and the barrier study reported above, we developed and conducted interventions in each of the three jurisdictions. Because of the variability in the types of programs, populations, and identified barriers, different interventions were developed for each site. In Madera, we designed and conducted a small-scale intervention to increase the number of certified centers in the County, and to increase the motivation among DIYers to recycle their used oil. In Napa, we designed and conducted a direct-mail intervention targeting DIYers served by a curbside oil collection program. The mailer incorporated normative elements, along with procedural information about the curbside collection program. In Los Angeles, we conducted and evaluated a large-scale intervention in which DIYers were given free oil collection containers through eight Kragen Automotive sites across the county.

Each of the interventions was carefully designed to incorporate specific elements drawn from existing social psychological research literature, and each was evaluated using rigorous empirical research methodology and a control group. In the following three sections, we summarize the procedures and results from each of the interventions.

Madera County

The focus of our Community Based Social Marketing Program in Madera County was to increase the utilization of collection centers for the proper disposal of used motor oil. Currently, there are 10 certified collection centers located within Madera County; however, only eight of the centers are active. In addition, special collection events are held semi-annually in an attempt to encourage the proper disposal of used oil. Lastly, information about the local collection centers and special events is distributed via pamphlets and local newspaper ads. While data obtained from the Madera Department of Environmental Management and new survey data collected as part of our CBSM project indicate a high Do-It-Yourself oil change (DIY) rate in Madera County (25%) with respect to the statewide average (19%), the data also demonstrate an underutilization of the local collection centers.

According to the U.S. Census (2000), the population in Madera County consists of 126,415 individuals. Using the countywide DIY rate of 25%, this yields approximately 31,604 potential users of the local oil collection centers. Based on previous findings that the average DIYer changes their oil 6.7 times per year, and that each oil change takes approximately 1.25 gallons of oil, we estimate a potential yearly collection of 264,681 gallons. Yet in 2002, only 38,596 gallons (15%) were collected through the local centers.

Two interventions were designed to increase the utilization of collection centers for the proper disposal of used motor oil. The first (motivational) intervention encouraged DIYers at an auto parts retail store in Madera County to make a commitment to recycle their used oil. The DIYers each received one of three incentives: a gift certificate, a gift certificate and an oil funnel, or a gift certificate and an oil funnel with an oil recycling pledge sticker on it. We predicted that the DIYers who received the funnel with the pledge sticker would be more likely to return and recycle their oil than the other DIYers. The second (structural) intervention attempted to recruit potential sites into developing certified collection centers.

Structural Intervention

Our initial efforts in Madera County were aimed at expanding the network of certified collection centers. At the start of the project there were eight active certified centers, located primarily in the more heavily populated areas of the county. By mapping the county, we were able to identify populations that were underserved, and we targeted retail outlets in those locations. Our review of the retail automotive outlets in the underserved areas revealed 46 potential collection centers. With the assistance of a local research assistant and county staff, we contacted each of these sites in an attempt to create new certified centers.

Each site was contacted by telephone and in-person by a trained researcher. The researcher described the certified collection center statewide program, the importance of recycling used motor oil, the benefits (both financial and social) of becoming a certified center, and the process for becoming and sustaining certification. The researcher offered to complete all the paperwork required to become a certified center, and to file the necessary forms for reimbursement for the first year following certification. The Madera County Department of Engineering and General Services offered to pay for the costs of purchasing and installing storage tanks at each of these facilities. In essence, we attempted to remove the foreseeable barriers to becoming a certified center.

Based on the initial phone call, 12 of the stores were receptive and were willing to get more information about the certification process. The owners of each of these stores were visited individually by the trained researcher, who presented them with a small packet of materials and described the steps to becoming a certified center. Following this second presentation, none of the store owners opted to proceed with the certification process. The reasons listed by each of these locations were classified into five categories:

- Liability issues surrounding spillage or leaking tanks.
- Not enough room for storage tank.
- People leaving oil outside store during non-business hours.
- The financial costs of maintaining the program—staff costs for paperwork, hauling fees.
- Too much unwanted contact with the government. Inspectors may report problems unrelated to recycling.

These findings will be useful for future efforts to expand certified collection center program in rural areas. Discussions with other oil researchers across the nation suggest that the reluctance observed in the current study is not unique to Madera. While recruitment efforts in rural areas might ultimately prove successful, we believe that other collection alternatives should be pursued. These might include free individual collection programs for rural residents storing large volumes of used oil on site, or county-run drop-off programs. An innovative program in rural Minnesota has installed a series of large storage facilities at unstaffed sites where residents can drop off oil at their convenience. We recommend investigating other alternatives for rural areas around the state.

Recommendation. The inability to recruit potential sites for the development of certified collection centers (CCCs) can be attributed to a number of factors, including lack of incentive, a seemingly complicated application and paperwork process, and government involvement with the stores. Future recruiting attempts for CCC development will benefit by overcoming these barriers. Specifically, greater financial incentives will likely be more effective. Responses by managers indicate that good PR and the small financial incentives they would receive are simply not enticing enough, nor are they worth the time and energy required to develop and maintain a CCC. In addition, simplifying and clarifying the guidelines and application procedure necessary for CCC development would make the process seem less complicated and time consuming. Although the process itself is straightforward, the website guidelines on becoming a CCC are overly complicated and may appear intimidating to many. Furthermore, managers who are asked to become involved in CCC development should be presented with a packet of the necessary paperwork and offered assistance with its completion and submission. Lastly, potential sites may be more responsive if they were assured about the low level of government involvement with their stores; that is, they may be more willing to participate if they were confident that the government would have minimal oversight of the CCC operations.

Motivational Intervention

In addition to the structural intervention, our CBSM pilot project also developed and tested a motivational intervention targeting DIYers in Madera County. Participants for the intervention consisted of 94 customers at Napa Auto Parts, located in the rural city of Oakhurst.

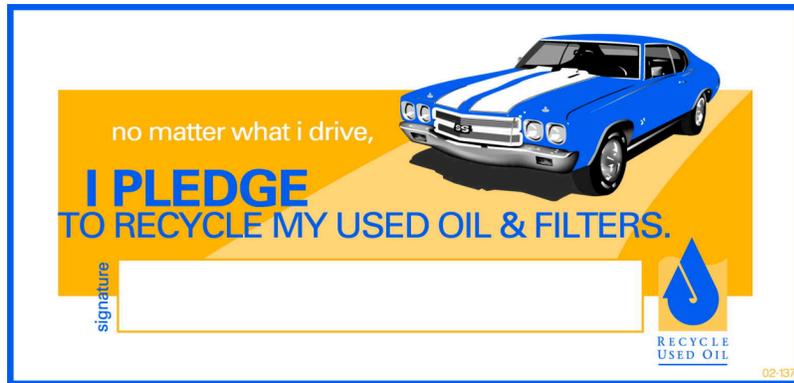
Materials. Materials included an initial survey and follow-up postcard, and a hands free recycling funnel affixed with either the standard CIWMB message (see Figure 5), or a CIWMB recycling pledge sticker (see Figure 6).

The initial survey asked customers about the number of times they changed their own oil, their disposal procedures, their normative beliefs about recycling used oil, their behavioral intentions, and their perceived importance of recycling used oil. The follow-up survey was similar, however it included a question about what they did with their used oil the last time they changed the oil in their vehicle.

Figure 5: *Standard CIWMB Message*



Figure 6: CIWMB Oil Recycling Pledge Sticker



Procedure. Two researchers surveyed 94 customers from Napa Auto Parts as they exited the store. Customers were randomly assigned to receive one of three intervention materials: (a) information about where to recycle used oil, (b) information plus a hands free recycling funnel with the standard CIWMB message on it, or (c) information plus a hands free recycling funnel with a CIWMB recycling pledge sticker on it. All participants were offered a \$5 incentive to participate. Customers who received the funnel with the pledge sticker had to sign their name, pledging their commitment to recycle their used oil and filter. Researchers ensured that the customers were not aware of the different incentives. After completing the survey, customers were offered an additional \$5.00 gift certificate if they gave permission to follow up with them a month later with a short survey which measured their actions.

Results. The initial sample of 94 DIYers was predominantly male (93%), and the average age was 45 ($SD=15$; Range from 18 to 89). The sample reported an average of 7.98 ($SD=12$) oil changes in the past year, with a range from 1 to 100. The median response was 4, with several respondents reporting a high rate of oil changing (40, 50, and 100 times).

The first set of items in the survey asked participants about their prior disposal methods. Response options included:

- Take it to a retail collection center (53%)
- Take it to a waste collection event (34%)
- Pour it on the ground (10%)
- Throw it in the trash (3%)
- Pour it down the drain (1%)
- Give it to a mechanic or service station (55%)
- Other means (7%)

Multiple responses were allowed, so the total reported percentages (shown in parentheses) sums to more than 100%. All seven of the “other means” responses were improper methods: burn (4), dust abatement on roads (2), brush it on horse hoofs (1). The responses were divided into proper (retail center, collection event, mechanic or service station), and improper methods (pour it on the ground, throw it in the trash, other). Of the 94 respondents, 19% reported at least one improper disposal method, and 91% reported at least one proper disposal method.

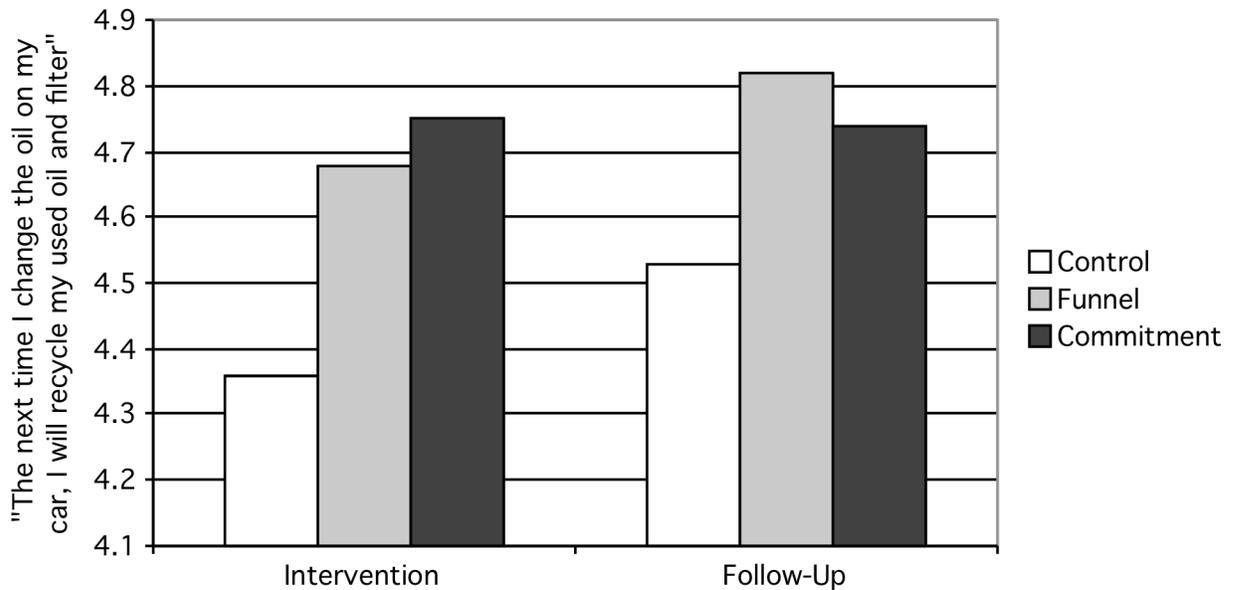
Participants were randomly assigned to one of three experimental conditions: control (information only; $N=33$); free funnel ($N=32$), or funnel plus the commitment sticker ($N=29$). The immediate impact of the intervention was tested by examining participants' self-reported intentions to recycle their used oil and filter. For these analyses, we focused only on DIYer who reported changing their oil 12 or fewer times per year. Participants were asked, "The next time I change the oil on my car, I will recycle my used oil and filter" with responses from 1 (Strongly Disagree) to 5 (Strongly Agree). While the overall results did not show significant differences in the mean scores of the three conditions ($F(2,80)= 1.77$; $p=.18$), the mean scores did show the expected pattern. Those participants in the control condition reported the lowest recycling intentions ($M=4.36$; $SD=1.06$), compared to the funnel condition ($M=4.68$; $SD=.79$) and the commitment condition ($M=4.75$; $SD=.44$). The difference between the control condition and the combined funnel and commitment interventions was statistically significant ($p<.05$). The funnel and commitment conditions did not differ significantly from each other. Mean scores are shown in Figure 7.

Of the 94 participants originally interviewed, 78 consented to participate in our follow-up survey and provided a mailing address. One month following the original interview, a short 1-page follow-up survey was sent to these respondents. The follow-up survey contained items asking about their disposal method "the last time you changed the oil on your car" along with the same intention item used immediately following the interview. The mail survey followed the recommendations of Dillman's (2002) tailored design methodology. Of the 78 questionnaires sent, 4 were returned undeliverable, and 42 were returned completed, yielding a working response rate of 57%. Of the 42 completed follow-up questionnaires, 16 were in the control, 10 were in the funnel condition, and 16 were in the commitment sticker condition.

Participants were asked if they recalled receiving the various elements of the intervention (control, funnel, sticker). For participants in the control condition, 75% correctly recalled receiving information about oil disposal in Madera County, 100% correctly recalled not receiving a funnel, and 100% correctly recalled not receiving the sticker. For participants in the funnel condition, 70% correctly recalled getting a funnel, and 80% correctly recalled not getting a commitment sticker. Finally, for participants in the commitment condition, 88% correctly recalled receiving the funnel, and 69% correctly recalled getting the commitment sticker.

With regard to future disposal intentions (e.g., The next time I change the oil on my car, I will recycle my used oil and filter), results showed a pattern similar to that found for the initial interview. Participants in the control condition were less likely to intend to recycle their oil and filters ($M=4.53$; $SD=.77$) than participants in the funnel condition ($M=4.82$; $SD=.40$) or the commitment condition ($M=4.74$; $SD=.45$). The information-only condition differed significantly ($p<.05$) from the combined funnel and commitment conditions, but the funnel and commitment conditions did not differ significantly from each other. The pattern of mean scores is shown in Figure 7.

Figure 7: Intentions to Recycle Used Oil and Filters Following Intervention



The questionnaire also asked about “The last time you changed the oil in your car.” In response to this item, participants in the control group reported taking it to a retail collection center (22%), pouring it on the ground (6%), storing it for later disposal (44%), and taking it to a mechanic or service center (28%). In contrast, participants in the funnel condition reported taking it to a collection center (40%), storing it (50%), and taking it to a mechanic (10%). Similarly, participants in the funnel plus commitment condition reported taking it to a collection center (37%), storing it (42%), and taking it to a mechanic (21%).

It is important to point out that none of the respondents in the funnel or commitment conditions reported any improper disposal the “last time” they changed their oil, whereas in the initial survey 19% reported some form of past improper disposal. One possible explanation for this finding is that those participants who reported an improper disposal did not participate in our follow-up. To test this possibility, we looked for change in reported disposal methods (prior to intervention, and then following the intervention). In the control condition, three of the participants reported improper disposal in the past. When asked about “the last time” they changed the oil on their car (following intervention), one reported pouring it on the ground, and two reported storing it for later disposal. In the funnel condition, two participants reported prior improper disposal at the initial survey. When asked about the “last time” they changed the oil in their car following the intervention, one of these reported taking it to a retail collection location and one reported storing it. Finally, for participants who were in the commitment condition, two reported past improper disposal in the initial survey. When asked about the last time they changed the oil in their car (following intervention), one of these reported taking it to a collection center and one reported storing it. Thus, we had seven follow-up respondents report prior improper disposal at the initial survey, and these seven were evenly divided across the three conditions (three, two, and two). This suggests that the changes identified by our analyses are not due to response differences across the conditions.

Summary and conclusion. The results from the motivational intervention suggest that targeting DIYers directly can be an effective strategy for promoting proper disposal of used motor oil. Three results from the intervention are worth highlighting. First, in our sample of 94 DIYers from Napa Auto Parts, 19% reported past improper disposal of used motor oil. This number is consistent with the recently-published report from researchers at San Francisco State University, which estimates improper disposal between 8% and 36% (CIWMB, 2002), but higher than our barrier survey data showing a self-reported improper disposal rate of 10%. Second, the results from our intervention show that both the commitment and funnel give-away produced an increase in intentions to properly dispose of used oil. The effect was found both immediately following the intervention and at the 1-month follow-up. Given our previous findings showing that intentions to act are strong predictors of subsequent behavior, this finding is encouraging. However, contrary to our predictions, the commitment intervention was not significantly more effective than the funnel alone. This result is surprising given the existing volume of research showing the power of commitment at changing behavior. One possible explanation for this finding is that by giving away the funnel in-person, there was an implied commitment to return the oil to Napa for disposal. Had the funnel been given away without any social contact by the researcher, the effect might have been considerably smaller. Nonetheless, the results show that distributing free funnels in-person to DIYers is sufficient to produce an increase in intentions to properly disposal of used oil.

Finally, the results showed a trend toward an increase in the proper disposal of used oil. At the 1-month follow-up, 6% of DIYers in the control condition reported improper disposal and only 22% reported taking it a certified collection center. In contrast, 0% of the respondents in the funnel condition reported improper disposal and 40% reported taking it to a collection center. In the commitment condition, 0% reported improper disposal and 37% reported taking it a collection center. These results are consistent with the findings for behavioral intention, and suggest that both the funnel and commitment interventions produced a change in behavior. However, the small sample size and low frequency of improper disposal preclude any stronger conclusions about the effectiveness of the interventions. While the findings are encouraging, additional research should examine the large-scale impact of these interventions.

Napa County

The focus of our Community Based Social Marketing project in Napa County was curbside oil recycling. Napa County currently offers residents of four regions (Calistoga, St. Helena, Yountville, and Angwin) the option to recycle used motor oil via curbside collection. To utilize the curbside program, residents must call Upper Valley Disposal Service (UVDS) to obtain an approved oil-recycling container and to schedule an oil pick-up. UVDS picks up the full container and leaves an empty one. Based on data regularly collected by the Department of Environmental Management, and new survey data collected as part of our CBSM project, there is good evidence that the program is underutilized.

At the time of our study, there were 5,400 households served by Upper Valley Disposal. The countywide DIY rate was 19%, which yielded 1,026 potential users of the program. Yet only 339 were enrolled in the program. Using previous findings that the average DIYer changes their oil 6.7 times per year, and that each oil change takes approximately 1.25 gallons of oil, we estimated a potential yearly collection of 8,593 gallons. Yet in 2002, only 600 gallons (7%) were collected through the curbside collection program. Furthermore, our survey data indicated that

33% of DIY residents who knew about the program chose not to use it, and we estimated another 59% of DIY residents did not know enough about the program to use it.

An intervention was designed based on the findings from the barrier study. Specifically, the intervention was developed to increase participation in the curbside collection program offered to Napa County residents, by utilizing normative messages to motivate oil recycling. Households were assigned to receive one of two mailers, which included normative information about the program. One version provided a phone number to call to join, and the other version included a commitment mail-in card. Using two response modalities allowed a test of the best response method to use for future county-wide interventions.

Method

Participation. Households located in four regions of Napa County that received garbage service from Upper Valley Disposal were targeted for the intervention. Information provided by Upper Valley Disposal indicate 921 households in St. Helena, 700 households in Calistoga, 702 households in Angwin, and 1112 households in Yountville were served by Upper Valley Disposal. This total differed slightly from the UVDS total of 5,400 served because of outlying unincorporated regions not included in our intervention.

Materials. Materials for the intervention included two experimental mailers and a follow up postcard. The mailers included both procedural information and normative information about the UVDS curbside collection program. The normative information was provided in the form of testimonials from residents with their photos, advocating usage of the program. Both versions of the mailer included identical procedural and normative information, however one version provided only the UVDS telephone number to call and sign up for the program, while the other version provided a commitment mail-in card. The card was used to obtain a commitment by the DIY resident to use the curbside program, and it served as a convenient means for potential users to sign up for the program, eliminating a possible barrier (i.e., the need to call). The front and back of the mail-in brochure is shown in Figure 8.

Figure 8: Four-Fold Mailer For Napa County (front and back)

Upper Valley Agency
1235 7th Street
Napa, CA 94559

Upper Valley Disposal Service
PO Box 382
St Helena, CA 94574

Detach and Mail Today!

Desprenda y regrese la tarjeta para que reciba gratis un recipiente para almacenar el aceite usado.

Paid for by a grant from the California Integrated Waste Management Board

HERE'S WHAT SOME OF YOUR NEIGHBORS SAY ABOUT CURBSIDE OIL PICK-UP:

"It's great! It's a very handy program, and I'm absolutely satisfied... If you're going to recycle your oil, no doubt it makes it easier... Oil is a finite resource, and it should be recycled!"
Stephanie Strauss, Angwin

"I use the program every time I change the oil in my vehicles... I know other people in the community do too."
Robert Holland, Angwin

"The program works well; it's a nice service from Upper Valley Disposal. It's so easy...you just call and they come. I don't have any complaints about it and we've used it for a long time...I'm sure other people do (too)."
Anonymous, St. Helena

"It couldn't be easier...everybody should use it; that's the bottom line!"
Juling Pescio, Calistoga

"I use it every time the oil is changed."
Ellie Sanders, Calistoga

"We use the program once a month...When we change the oil we just put it in the container...It makes it very easy!"
Charlotte Rice, St. Helena



"It's worked very well for us... I just think that it's very important that all of us be responsible to not pollute our environment... we should put forward the effort, and I'm so thankful that we have a means of doing it without making it difficult."
Evaline West, Angwin

Upper Valley Agency
1235 7th Street
Room 101
Napa, CA 94559

Are you one of the
20,000
residents in Napa County who change their own motor oil?



"Everybody should use it!"
Larry Varland, St. Helena.

CURBSIDE OIL RECYCLING
"Free, Easy and Convenient"

CURBSIDE OIL RECYCLING

A SUCCESS IN UPPER VALLEY!

IT'S EASY AND CONVENIENT!

- Are you one of the 20,000 people in Napa County who change their own oil? Join your neighbors who have found that curbside pickups make oil recycling the easiest and fastest way to "do the right thing."

"Do it yourself" oil changers can take used oil to a collection center but that takes time. The most convenient way to recycle oil is to have it picked up at your own curb. Upper Valley Disposal (UVDS) makes it easy with their curbside collection program. Not only do they pick it up for you—they'll even provide a free reusable container.

- Initiated in 1996, UVDS has picked up over 5,550 gallons of oil from 400 households throughout Angwin, Calistoga, St. Helena and Yountville. Many of your neighbors are already using the program - let Upper Valley Disposal service you too!



"It's very convenient!"
Tom Balcer, Calistoga

HOW IT WORKS

Curbside oil collection is **free and easy** for UVDS customers:

- Complete the attached mail-in card to enroll in the curbside oil collection program. Drop the card in the mail, and an oil recycling container will be dropped off at your house on the next garbage collection day.
- Funnel your used motor oil into the UVDS container. Screw the lid tightly and wipe off any excess oil.
- Call (707) 963-7988 and tell them "I have used oil to be picked up this week." You must call each time you want an oil pick up, so that the driver knows to look for your oil—Remember, it only takes a minute to call! Customers are allowed unlimited pickups.
- Place the container next to your recycling bin or trash can.
- UVDS will leave an empty container for your next oil change. Only one container (2.5 gallons) is allowed per pick up.

Remember...

- You must use only the UVDS container—used motor oil will not be picked up in any other container.
- When you put the container on your curb, put it where it won't be knocked over. You are responsible for your oil until it is picked up.
- Please keep the oil free of other fluids, including water, gasoline, antifreeze, and paint. Contaminated oil will not be picked up by UVDS. (Call 1-800-934-9661 for information about how to dispose of contaminated oil and other Household Hazardous Waste).

I would like to participate in the UVDS curbside collection program. Please deliver a UVDS oil recycling container to:

Name: _____

Street Address: _____

City: _____ State: _____ Zip: _____

Phone Number: _____

Email Address: _____

Detach and Mail Today!



Desprenda y regrese la tarjeta para que reciba gratis un recipiente de aceite usado.

PRINTED ON RECYCLED PAPER

The follow-up postcard, approximately a 1/3 page in length, contained a message similar to that used in the initial mailing. It included procedural information and testimonials, but was less detailed than the brochures. The insert is shown in Figure 9.

Figure 9: Follow-up 1/3 Sheet Mailer for Napa County



Pilot testing. The brochures shown above were the end result of a series of pilot studies. Prior to distributing the brochures, we tested their ability to convey knowledge, social norms, and ease of the behavior. Participants in the final study were 68 University students (49 women and 18 men; median age = 21) who read and evaluated one of three brochures: the mail-in, phone-in, or a control. The control included the phone-in information, but no graphics or normative information. After reading the brochure, participants responded to a series of survey questions intended to measure memory for the content of the message, social norms, and perceived difficulty of using the curbside program (NOTE: these are the three target points identified in the barrier survey). Participants were randomly assigned to read one of the brochures (Control = 23; Phone-in = 20; Mail-in = 21). A graphical representation of the results is presented in Figure 10.

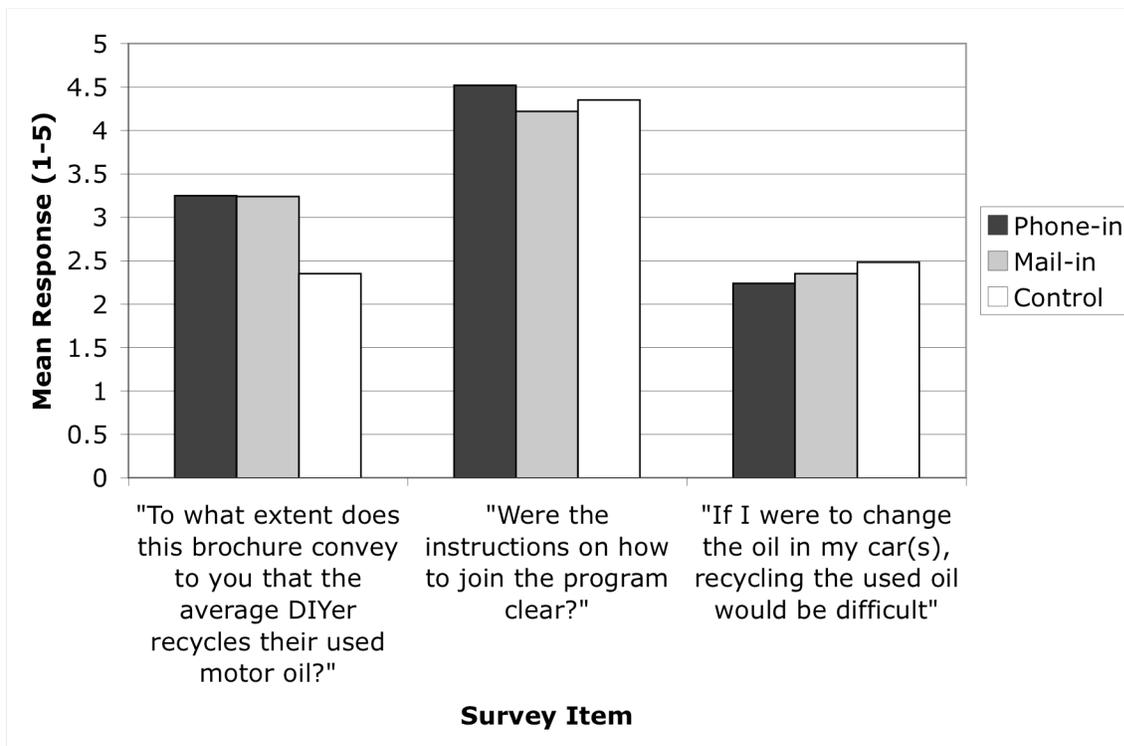
1. Knowledge and content. Overall, the content of the brochures was rated as clear and understandable. One hundred percent of the participants understood the purpose of the brochure, 100% correctly identified the target audience (DIYers), and 100% of participants in the mail-in and phone-in conditions correctly described the process for joining the program. All of the messages were rated as clear (Control *Mean* = 4.35 on a 5-point scale; Phone-in = 4.52; Mail-in = 4.22), and respondents perceived the instructions for how to join the program as clear. The message was generally liked, although three of the respondents in the phone-in condition and one in the mail-in condition indicated that they did not like the message.

2. Social norms. The most powerful component in the brochure was the testimonials. When asked, “To what extent does this brochure convey to you that the average DIYer recycles

their used motor oil?" the two normative messages (phone-in and mail-in) were rated substantially higher ($Mean=3.25$ and 3.24 respectively) than the control ($Mean=2.35$). A similar pattern emerged in response to the question "What percentage of DIYers recycle their used motor oil?" ($Mean=2.65$ and 2.95 for phone-in and mail in; $Mean = 2.00$ for control).

3. Perceived behavioral control. Although curbside recycling is viewed as much easier than other collection methods, our barrier survey showed that some residents view joining the program as a barrier. While we believe that the brochure will help to overcome this barrier, we asked participants in our study "If I were to change the oil in my car(s), recycling the used oil would be difficult." In this sample, the phone-in brochure was rated as less difficult than the mail-in, which was rated as less difficult than the control.

Figure 10: Summary Results for Knowledge, Social Norms, and Perceived Difficulty



Given the encouraging results from the pilot study, we proceeded to distribute the materials to residents in Napa County.

Procedure. Households in two regions of the County (St. Helena and Calistoga) were assigned to one of two experimental conditions. Households in Angwin and Yountville served as delayed-treatment, matched controls. Those in the experimental conditions received either the phone-in mailer (St. Helena), or the mail-in brochure (Calistoga) by postal mail. To increase the credibility of the materials, the intervention materials were mailed directly from the Napa County Department of Environmental Management. This direct mail procedure, while more costly than other distribution methods like handing them out at collection events, allows for all DIYers in the

area to receive the message. Other, more targeted distribution methods, tend to get the information into the hands of individuals who are already inclined to engage in the behavior. A direct mail distribution method can provide an effective means for getting the message out when there is good evidence to suggest that a large percentage of the population doesn't know about or engage in the behavior.

In order to reinforce the initial mailer, the 1/3 sheet follow-up was distributed to residents one week following the initial mailing. The follow-up served two purposes. First, it provided an additional message for the target audience, thereby increasing the chances that DIYers in the targeted area would hear about the curbside program. Second, it served as a reminder for those DIYers who had already seen the intervention materials.

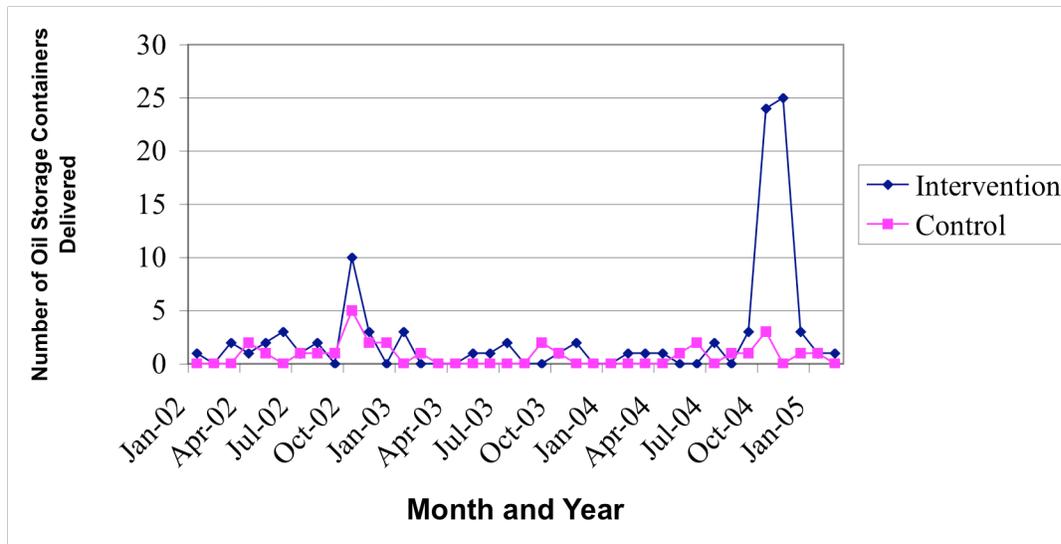
The effectiveness of the intervention was evaluated by counting the number of people signed up for the curbside program in each of the areas. In addition, gallons of oil collected through the curbside collection program were obtained for each of the four regions of the county.

Results

The results from our barrier survey indicate that 19% of the residents in Napa County were DIYers. Using this percentage, we estimated that the potential target population for our intervention materials was 175 in St. Helena (921 residents * 19%), 133 in Calistoga, 133 in Angwin, and 211 in Yountville. This yields a combined total of 652 potential participants in the curbside collection program.

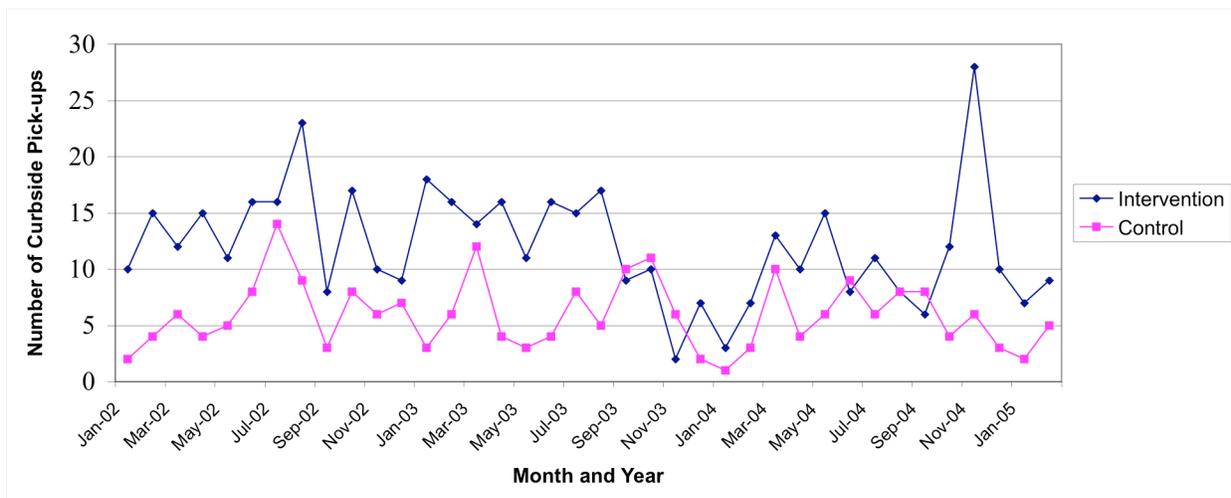
During the four weeks following the initial mailing, UVDS received 15 calls and 25 mail-in cards. In St. Helena, the area that received the phone-in brochure, there were 68 people signed up for the program before the mailing, and 83 following. This is a 22% increase in the size of the program. In Calistoga, there were 25 mail-in cards returned. Prior to the mailing, there were 56 residents enrolled in the program, and following there were 81 residents. This is a 45% increase in the size of the program. Monthly data was obtained from UVDS showing the number of oil containers delivered each month to homes served by the curbside program. A graphical representation of this data is shown in Figure 11. The spike in the number of oil containers delivered in September 2004, corresponds exactly to the timing of our intervention.

Figure 11: *Number of Oil Storage Containers Delivered Each Month to Intervention and Control Areas in Napa County*



Additional data was obtained from UVDS showing the number of oil pick-ups each month, going back to January 2002. The data is shown in Figure 12. The results show a sharp spike in the number of pick-ups immediately following the intervention. From a historical average of 11.85 pick-ups each month, to 28 pick-ups immediately following the intervention—an increase of 248%. The control areas remained flat, with a historical average of 6.26, and 6 during the intervention. One surprising finding is the quick drop in the volume of oil collected from the intervention areas during December, 2004 (although still nearly double the number of pick-ups made in the control areas). Additional data is needed to evaluate the long-term impact of the intervention, but given the growth in the size of the program and the immediate spike in the number of pick-ups, we are optimistic that the gains produced by the intervention will be long-lasting.

Figure 12: Number of Monthly Curbside Oil Pick-ups in Intervention and Control Areas of Napa County



Delayed treatment. Given the demonstrated superiority of the mail-in version of the brochure, the two control counties (Angwin and Yountville) received this message four months following the initial intervention. In Angwin, there were 72 residents originally enrolled in the program. In response to the mailing, 31 joined, bringing the total to 101—a 43% increase. In Yountville and Yountville County, there were 39 residents originally enrolled in the program. 18 residents joined in response to the mailing, bringing the total to 57—a 46% increase. Both are quite consistent with the 45% increase associated with the mail-in version for the initial intervention.

Conclusions. The results from the Napa intervention demonstrate the usefulness of the CBSM approach at increasing oil collection through a curbside collection program. While curbside collection programs are generally perceived as easier than drop-off programs, there are still a number of potential barriers that could reduce the overall effectiveness of program. The results from a survey of Napa residents uncovered several potential barriers, which were targeted through a direct mail marketing intervention. Across a variety of measures, the results showed a substantial increase in the number of households enrolled in the program, along with a dramatic

increase in the number of used oil pick-ups immediately following the intervention. In the month immediately following the intervention, there was a 248% increase in the volume of oil collected. These results are encouraging, but additional data will be needed to evaluate the long-term impact of the intervention.

It is tempting to interpret the findings from this study as evidence for the effectiveness of a direct mail marketing campaign aimed at educating residents about the importance of used oil recycling. While our results do show that the direct mail medium can be an effective channel for reaching residents, it is important to highlight several reasons why our message produced such dramatic effects. First, the barrier study indicated that there were a large number of residents who did not know about the program. As a general rule, providing information will not be an effective behavior-change strategy unless there is evidence that the target population generally does not know about the program (Schultz, 2002). Second, the marketing materials included both procedural information and normative information. The combination of basic information (i.e., what, where, when) with a motivational message (i.e., testimonials conveying the social norm that other residents in the area do recycle their used oil) undoubtedly contributed to effectiveness of the message. Finally, the message was sent from a credible source (UVDS and the Napa County Office of Environmental Management) with first class postage. This approach increases the likelihood that residents will look at the information, and respond. This is in stark contrast to many direct mail messages that are metered as bulk mail with no credible office or organization affiliation provided.

Los Angeles County

The oil-recycling program in Los Angeles consists of over 600 certified oil collection centers and offers weekly special collection events. To recycle oil, the used motor oil must be stored in proper containers. Response to the program has been good but people are often turned away due to contaminated or improperly stored oil. The current program places considerable emphasis on education. Information with procedural information about oil recycling has been distributed through fliers, radio and television ads, and there is interest in finding a celebrity spokesperson. Prior research of the existing program has been conducted via focus groups, retail research reports, and surveys. The two most common reasons cited for not recycling were: inconvenience and lack of time. The current CBSM project was designed to increase oil-recycling behavior, increase the number of oil collection containers distributed, and to increase the amount of oil recycled.

The intervention followed a Community Based Social Marketing (CBSM) approach, as outlined by Doug McKenzie-Mohr (1999, 2002). One of the cornerstones of this approach is the identification of barriers associated with the behavior. These barriers can be structural (no container for storing oil) or psychological (no motivation to recycle). In fact, research in Los Angeles County has identified the lack of a proper storage container for used motor oil as one such barrier. According to a 2002 survey, 69% of respondents identified “being supplied with a free oil recycling container” as a factor that would increase oil recycling. As a result, our intervention provided free 15-quart oil recycling containers to customers who purchased at least 3 quarts of motor oil in selected Kragen Auto Parts stores in Los Angeles County.

In order to enhance the effectiveness of the free containers, we modified the standard CIWMB sticker customarily affixed to the containers. The current sticker (see Figure 5 on page 23) provides information about what to do with used motor oil and filters, but leaves out motivational factors. Research has shown that information-only messages, which Schultz (2002) refers to as procedural information, tends to have little effect on behavior. We propose that designing a new sticker that targets motivation will further increase oil recycling.

Method

Participants. The intervention targeted DIYers in LA County. Our sample consisted of customers at 16 Kragen Auto Parts stores.

Matching. In order to provide comparable experimental and control conditions, stores were matched on the volume of oil collected, the primary language of the customers (English or Spanish), and the growth in oil volume over the past four years. The primary language of the customers was obtained using Census block group data. Historical data on the volume of oil collected quarterly at each store was obtained from CIWMB. Stores were matched on the volume of oil collected during 2002, and also on the growth rate of oil collection. Growth rate was determined by the beta coefficient resulting from a regression analysis for each store in which volume was regressed onto quarter. Eight matched pairs of stores were selected from the 91 certified Kragen stores in L.A. County, and each matched pair was then assigned to either an experimental or control condition.

In order to protect the confidentiality of the stores included in this experiment, all oil data are reported in aggregate so that no individual store can be identified without obtaining

additional data from the CIWMB. The 16 stores included in the study, divided by matched pairs, are shown in Table 7.

Table 7 – Kragen Stores Included in the Community Based Social Marketing Pilot

CBSM Stores	Address	Language	CBSM Matched	Address	Language
19-C-04153	4401 Slauson Ave. Maywood, CA 90270	English (3%) Spanish (97%)	19-C-04154	1516 E Florence LA, CA 90001	English (6%) Spanish (94%)
19-C-04082	15725 Downey Paramount, CA 90723	English (25%) Spanish (63%)	19-C-04086	15122 1/2 Hawthorne Lawndale, CA 90260	English (37%) Spanish (45%)
19-C-04122	14503 Ramona Bl Baldwin Park, CA 91706	English (22%) Spanish (78%)	19-C-03902	14550 Nordhoff Panorama City, CA 91402	English (15%) Spanish (78%)
19-C-04158	806 W Beverly Bl Montebello, CA 90640	English (36%) Spanish (36%)	19-C-04084	7839 Fireston Downey, CA 90241	English (41%) Spanish (47%)
Standard Intervention	Address	Language	Standard Matched	Address	Language
19-C-04119	15840 E Gala Ave Hacienda Heights, CA 91745	English (39%) Spanish (43%)	19-C-03864	13601 Hawthorne Hawthorne, CA 90250	English (38%) Spanish (45%)
19-C-03865	4315 S Western Los Angeles, CA	English (39%) Spanish (49%)	19-C-02639	14156 Paramount Paramount, CA 90723	English (20%) Spanish (68%)
19-C-04081	132 E Compton Compton, CA 90220	English (38%) Spanish (61%)	19-C-04121	1910 Rosecrans Compton, CA 90220 (<i>see note</i>)	English (35%) Spanish (32%)
19-C-04167	9775 S Otis St Southgate, CA 90280	English (13%) Spanish (87%)	19-C-02654	18344 Sherman Reseda, CA 91335	English (23%) Spanish (66%)

Note: The original matched control for this location was 19-C-04088 (6501 Laurel Canyon, N. Hollywood, CA, 91606). However, this store was relocated during our study, and as a result we substituted an alternate matched control.

Materials. Materials for the intervention included 2,944 15-quart oil storage containers. In one condition, 1,468 of the containers were affixed with the standard CIWMB message (see Figure 5), which displayed an oil drop graphic and the text: “Recycle Used Oil & Filters.” The message also provided a phone number and website URL for information on the nearest collection center.

In another condition, 1,476 of the containers were affixed with an experimental motivational message (see Figure 13); this sticker was designed to increase the likelihood that DIYers would return to Kragen to recycle their used oil by providing a motivational component. The sticker was selected following a series of focused interviews with DIYers, and a pilot study of DIYers at Kragen stores. Results from the field testing were summarized in a separate report and are available upon request.

Figure 13: CBSM “Last Step” Motivational Sticker



To guide the Kragen employees at the experimental stores, a script was printed on a 5 x 7 laminated card which instructed them to keep a sample container visible to customers, offer the container to the targeted customers, and to keep track of the customers who participated. Suggested dialogue was also printed on the card.

A series of post-intervention questions was developed for a telephone interview with the managers at the 8 experimental stores. The questionnaire was designed to obtain employees' tallies and estimates of the number of customers who participated in the program, to assess overall employee compliance with the program, their satisfaction with the program, and their general impressions regarding the success of the program.

Procedure. Sixteen Kragen stores in L.A. County were involved in the study: four stores distributed free containers with the standard procedural information (standard experimental condition), four stores distributed free containers with a motivational “take the last step” message (CBSM experimental), four stores served as the matched controls for the standard message (standard control), and the last four stores served as matched controls for the motivational message (CBSM control).

Each of the experimental stores was shipped pallets of oil storage containers on an as-needed basis. The 15-quart oil storage containers were distributed to customers as an incentive to return to the respective site and recycle their used motor oil. Shipments began in January 2004, and concluded in March 2004. Data regarding the volume of used oil collected by each of the stores was recorded and provided by the CIWMB; this served as the primary dependent variable for the study.

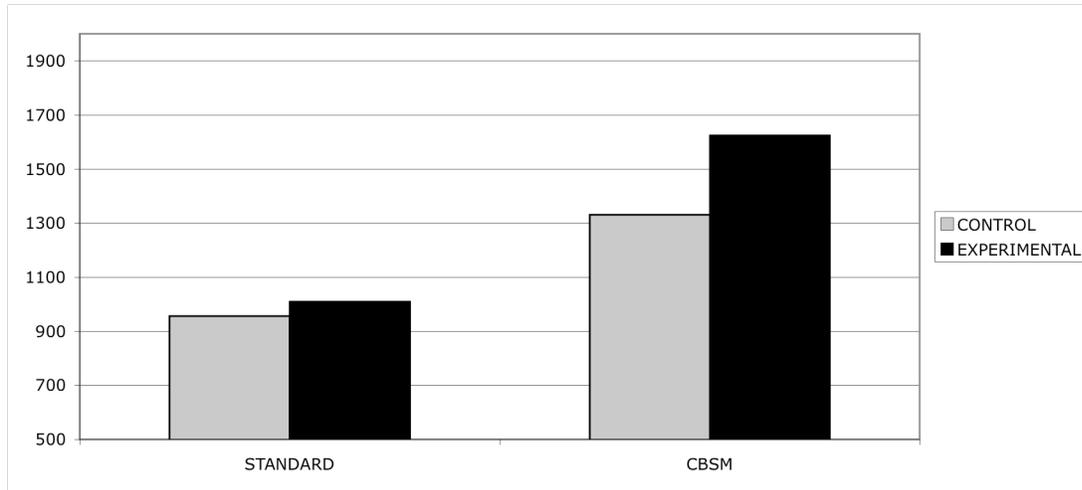
Results

Changes in Oil Volume. Our primary analyses were conducted on the gallons of oil collected from each of the 16 stores in our experiment, as recorded by the CIWMB. The analyzed data were the quarterly reported gallons of oil collected at each of the 16 stores for the quarter prior to the intervention (2003.Q4), the quarter during the intervention (2004.Q1), and the quarter following the intervention (2004.Q2).

The first analysis was based on the amount of oil collected during the intervention quarter. The mean scores for each of the four conditions are shown in Figure 14. The data show

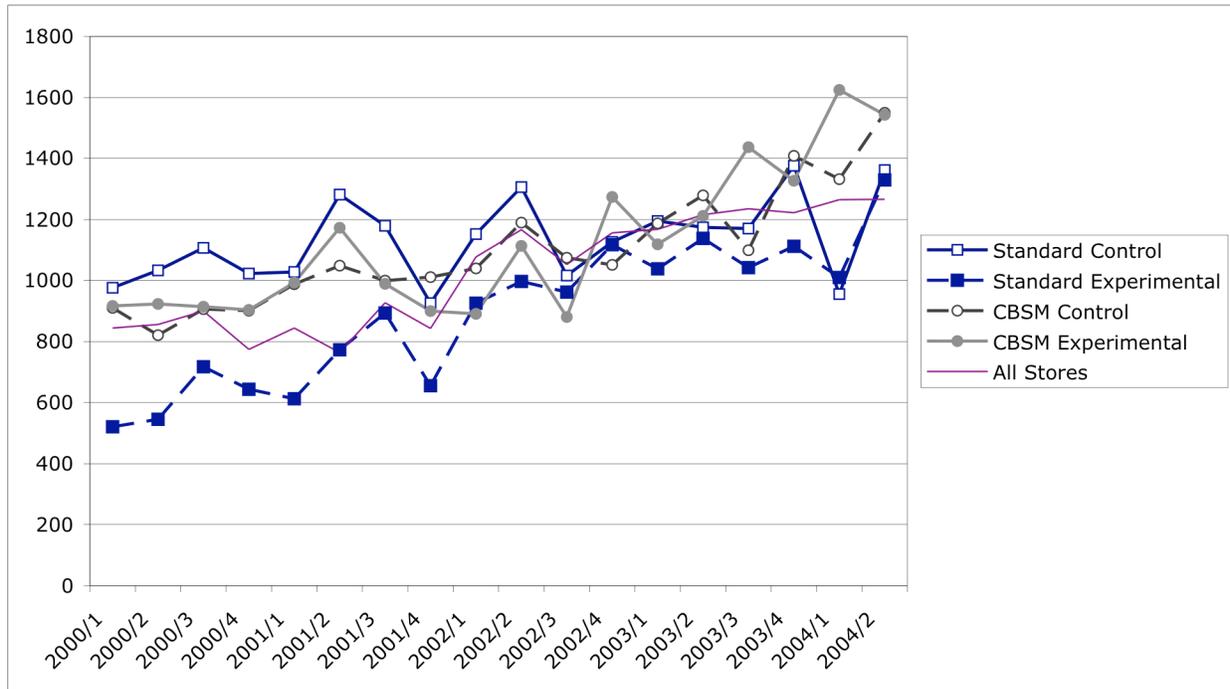
that the CBSM sticker (“Take the Last Step”) produced the largest increase in the amount of oil recycled during the intervention period ($M=1624$; $SD=513$), compared to the matched control condition ($M=1331$; $SD=382$; $t(3)=3.19$; $p<.05$). This corresponds to a 22% increase. The standard sticker condition ($M=1009$; $SD=288$) produced a smaller increase in the amount of oil recycled compared to the matched control ($M= 955$; $SD=658$; $N=4$). This change of 6% was not statistically significant.

Figure 14: Gallons of DIY Oil Collected in Experimental and Matched Controls During Intervention



While these findings show a clear pattern, they do not tell the whole story. First, they do not take into consideration the historical trends in oil volume. While this issue was anticipated and addressed using our careful matching procedure, there was still considerable variability across the conditions. To more clearly reflect the historical trends in the data, Figure 15 shows the quarterly gallons of data collected by condition since 2000.

Figure 15: Historical Trends in Gallons of Oil Collected by Experimental Condition



The data summarized in Figure 15 show that there is a general positive slope to each of the conditions, reflecting a consistent increase in the use of certified oil collection centers over the past five years. In addition, the figure shows the significant increase in oil collected in the CBSM experimental stores, relative to both historical averages and matched controls. The line labeled “all stores” represents the gallons of oil collected quarterly from all 91 Krugen stores countywide. However, the effect was short-lived, and by the second quarter following the intervention (2004.2), the difference between the CBSM experimental ($M=1542$) and match controls ($M=1549$) was no longer significant.

Given the large amount of historical data available for each store, we wanted to examine the larger-scale trends in oil recycling at certified collection centers in L.A. County by analyzing the data from approximately 91 Krugen stores.[†] Historical data from 2000 (Q1) through 2004 (Q2) were analyzed and compared with the trends found for the experimental and control conditions. For each group, we regressed gallons of oil collected onto time from 2000 (Q1) = 1 through 2003 (Q4) = 16. From these five equations, we calculated the standardized regression coefficient, the slope, a predicted value (\hat{Y}) for the intervention period, and a standard error (SE) for the predicted value. We then compared the intervention volume (2004.Q1) to the predicted volume (\hat{Y}) calculated using the regression equation.

For the combined stores, there was a steady upward trend in the average volume of oil collected at each store ($beta=.89$; slope = 33; $SE=82$). The predicted value for 2004(Q1) was 1279 (± 161) and the observed volume of oil was 1221, well within the confidence interval.

[†] The number of certified Krugen stores fluctuated over the four-year period, and there were some inconsistencies in the dataset. For our purposes here, the approximate increase or decrease in the average amount of oil collected at each store is a good indicator of historical trends, and not the total amount of oil collected.

Similar analyses were performed for the four experimental and control conditions. The regression equation for the standard control condition showed an unexpected decrease in the volume of oil collected. The regression equation ($\beta=.56$; slope = 15; $SE=107$) yielded an expected volume of 1254, but the observed was only 955, significantly lower than the expected value and below the 95% confidence interval. For the CBSM control, the regression equation ($\beta=.88$; slope=28; $SE=76$) yielded a predicted 1293. The observed volume was 1331, well within the 95% confidence interval.

For the standard experimental stores, the regression equation ($\beta=.93$; slope=42; $SE=84$) yielded a predicted volume of 1212. The actual volume was 1009, significantly below the expected volume. For the CBSM experimental condition (“last step”), the regression equation ($\beta=.74$; slope=28; $SE=125$) yielded an expected volume of 1296. The actual volume was 1624, significantly above the 95% confidence interval. It is noteworthy that both of the control conditions and the standard experimental stores showed a *decrease* in the volume of oil collected in 2004(Q1), whereas the CBSM experimental condition showed a marked increase.

Findings from Ancillary Variables

Additional analyses were conducted using interview data obtained from the store managers at the 8 experimental sites. Although employees were asked to track the number of containers returned by customers for oil recycling, interviews with store managers indicated low levels of compliance. For instance, three of the experimental sites failed to maintain any standard tracking system, and one of them tracked the number of containers they gave away, rather than the number of containers that were returned for recycling purposes.

Although the tallies were not provided, records from the company contracted to deliver the containers to the different sites offered concrete numbers regarding how many containers each site received. In addition, each store manager was able to provide estimates of how many customers accepted the containers, and how many returned to recycle their used oil. Among the four stores with the standard sticker, managers estimated that 94% of customers who were offered the container accepted it, and of these 46% were returned with oil. Among the four CBSM experimental stores (“last step”), managers estimated that 97% of customers accepted the container, and 49% were returned for recycling.

Store managers were asked for their evaluation of the program, and whether the program motivated their customers to recycle their oil. Without exception, all eight of the managers were positive about the program. Following are some quotes from the interviews with the managers:

- “It was a success...if you have more, I’ll take them!” - Store #1557
- “People can’t afford the containers so giving away free containers was very helpful...people used to bring their oil in plastic bags, open containers, and buckets, so they either spilled in the parking lot or in the store—now there is a lot less spillage.” - Store #1545
- “I had to call the oil co. to pick it up every week instead of every 2 weeks because we have so much more recycled oil!” - Store #1561
- “I’d be delighted to see the program! It’s a plus!” - Store #1578

- “Great program...Should do it every season (summer) when people are getting ready to take their cars out on vacations...I feel positive about it and being able to give them away.” - Store #1576

Discussion

The results from the intervention and analyses show several interesting findings. First, we find clear evidence for the effectiveness of the CBSM experimental “last step” message combined with the free oil container. The CBSM experimental message was created to reinforce an individual’s commitment to recycle their used motor oil. The embedded message is “you’ve already done the hard part, now TAKE THE LAST STEP.” The results from all analyses showed the superiority of the CBSM motivational message compared to the matched control condition, the standard CIWMB sticker, and the historical trends in oil collection at stores throughout L.A. County. Unfortunately, this effect lasted only for the duration of the intervention, after which the experimental and matched control stores did not differ significantly.

The results regarding the standard sticker combined with the free oil container were mixed. Based on the overall mean scores and the regression analyses, one would conclude that the standard intervention did not produce a significant increase in the volume of oil collected. One possible explanation for this effect is that not enough containers were distributed at the larger stores to have an impact on the total volume of oil collected.

Finally, the results from interviews with store managers suggest that the approach is very popular. Managers overwhelmingly expressed their support for the give-away program, and one manager even mentioned that his store sales increased because of the program. This suggests that implementing these types of programs in other jurisdictions should be easy.

Recommendation. Based on these findings, we recommend the use of free container give-aways, coupled with a motivational message. The findings for the “last step” message were clear and consistent, whereas the results from the standard sticker were less clear. We believe that the “last step” message was effective because it adds a theoretically derived motivational component to the free give-away.

Many funded interventions are information-based and fail to produce any substantial impact. A number of recent scientific studies have shown that while lack of information can be a barrier to action, it is not a source of motivation. Knowing what to do is not sufficient to produce behavior; in addition to knowing what and how, the person must also have a reason to do it. Adding a motivational component to marketing materials can substantially increase their efficacy. The “last step” message developed for this L.A. intervention could easily be adopted in other locations, or applied to other marketing materials. Based on the results from this study, and other academic studies, we strongly suggest moving beyond information-based messages intended to change behavior.

Conclusions and Recommendations

Oil disposal is an important social and environmental issue for California. In 2003, 150 million gallons of lubricating oil were sold in California, of which 92 million were recycled. While the State has in place an infrastructure for collecting and rerefining used oil, targeting do-it-yourself oil changers has proven a challenging task. Statewide estimates indicate that 19% of the population are automotive do-it-yourselfers (DIYers). The used oil and filters generated by DIYers is collected through a large network of certified collection centers, local government-run collection sites and events, and curbside oil collection programs. With a population of approximately 35 million, we estimate that DIYers generate 55.7 million gallons of used oil each year. Of this, 21.8 million were collected, almost all of which came through certified collection centers. The goal of this project was to pilot test the effectiveness of the Community Based Social Marketing approach to promote proper oil disposal among DIYers.

The Community Based Social Marketing approach involves four steps: (1) identifying the barriers and benefits to a behavior, (2) developing a strategy utilizing behavior change tools, (3) piloting the strategy, and (4) evaluating the strategy once it has been implemented. The project summarized in this report utilized the CBSM approach in three California Counties. First, the specific behaviors were identified and the barriers to performing these behaviors were uncovered. Second, using the Theory of Planned Behavior as a guide, we developed strategies for behavior change in each of the jurisdictions. Third, these strategies were piloted, and fourth the interventions were implemented. The outcomes from each of the interventions were carefully evaluated using empirical methodology and a control group.

Across all three jurisdictions, the results showed the power of the CBSM approach at producing behavior change.

- In **Madera County**, we found that both a free funnel, and a commitment intervention, produced increases in the intentions of DIYers to return their used oil to a certified collection center. The results were even more pronounced one month following the intervention, at which time 6% of DIYers in the control condition reported improper disposal and only 22% reported taking it to a certified collection center. In contrast, 0% of the respondents in the funnel condition reported improper disposal and 40% reported taking it to a collection center. In the commitment condition, 0% reported improper disposal and 37% reported taking it to a collection center.
- In **Napa County**, our intervention consisted of a series of direct mail brochures sent to residents served by a curbside collection program. The results showed a dramatic increase in the number of residents in two experimental areas enrolled in the program (22% and 45% respectively), whereas the control communities showed no change. Even more impressive is the 248% increase in the number of curbside oil pick-ups in the month immediately following the intervention. A delayed treatment in the control areas produced results consistent with the initial pilot intervention.
- In **Los Angeles County**, our intervention consisted of free oil storage containers distributed to DIYers through Kragen Autoparts stores. During the intervention, 2,944 15-quart oil storage containers were given away, half of which were affixed with a newly created “Take the Last Step” marketing slogan, and the other half affixed with the standard CIWMB sticker.

Results showed that the “Last Step” sticker produced a 22% increase in the volume of oil collected during the quarter immediately following the intervention, whereas the standard sticker produced a smaller (6%) increase.

Combined, these results suggest that the CBSM approach can effectively be used to change behavior and promote oil recycling among DIYers. However, there are several important aspects of the findings that deserve comment. First, the barriers across the three jurisdictions were different, necessitating the need for interventions tailored to each of the counties. Given the variability in programs and populations across California’s 58 counties, it seems unlikely that one intervention will be effective in all areas. Because the CBSM approach is grounded in the community context, it can be an effective tool for identifying and overcoming a variety of barriers.

Second, while we believe that the interventions must be community-based and tailored to the specifics of each jurisdiction, we also believe that there is merit to pursuing a general set of survey items that could be used to identify barriers to oil recycling Statewide. That is, while the existence or prevalence of specific barriers is unique to each jurisdiction, we believe that a single set of survey items could be established to assess them. Once developed, data could be collected from each of the counties throughout the State, and an integrated barrier survey report could be prepared highlighting the barriers in each of the jurisdictions, and providing recommendations for effective intervention strategies. Such a report would be particularly useful for jurisdictions that lack the resources to conduct their own barrier study, but who want guidance and suggestions on effective points of intervention.

Appendix A
Barriers to Oil Recycling Survey

<SQHELLO>

Hello, my name is, _____ and I'm calling from the SBRI survey lab at Cal State University San Marcos. We're talking to residents in [Madera/Napa] to get their opinions about issues surrounding automobile maintenance.

[PRESS 1 TO CONTINUE IN ENGLISH]
[PRESS 2 FOR CALLBACK/REFUSAL/OTHER]

<Mid-Interview Callback>

Hello, my name is _____ and I'm calling from the SBRI survey lab at Cal State University San Marcos. We spoke recently with someone at this number, and I was calling back to see if we could finish our survey.

Is [CONTACT PERSON] AVAILABLE?

[PRESS 1 TO CONTINUE IN ENGLISH]
[PRESS 2 FOR CALLBACK/REFUSAL/OTHER]

<Sintro> Are you at least 18 years of age? [IF NO, ASK TO SPEAK WITH SOMEONE WHO IS 18 YEARS OR OLDER]

1. YES [CONTINUE WITH INTERVIEW]
2. CALLBACK/REFUSAL/OTHER

<SINTRO2> The interview will take about five minutes and your participation is voluntary. The answers you give will be kept strictly confidential and you may stop the interview at any time. I am also required to let you know that this call may be monitored for quality control purposes. May we continue?

<Q1> Do you own at least one car (or truck, SUV, etc)?

0. No [skip to QNOTQAL1]
1. Yes

9. REFUSED [skip to QNOTQAL1]

<Q2> In the past year, how many total times have you changed the oil in the cars you own?

97. HAS NOT CHANGED OIL IN THE PAST YEAR [skip to NOCHANGE]
98. DON'T KNOW [skip to NOCHANGE]
99. REFUSED [skip to NOCHANGE]

<Q3> Who changes the oil in your car(s)?

[DO NOT READ ANSWER CHOICES]

[Check all that apply]

1. I DO IT MYSELF
2. FRIEND OR FAMILY MEMBER
3. I TAKE IT TO A SERVICE STATION/DEALERSHIP/MECHANIC
4. OTHER [specify]

8. DON'T KNOW
9. REFUSED

If Q3 ≠ 1, skip to [NOTDIY]

<T1> For the following items, please remember that your responses are anonymous and confidential. We're trying to better understand the automobile maintenance issues that may exist in your community, and we really want your honest answers.

<Q4a> Can you tell me what options are available for disposing of used motor oil in your community?

[DO NOT READ ANSWER CHOICES/CHOOSE ALL THAT APPLY]

- CURBSIDE COLLECTION PROGRAM/UPPER VALLEY DISPOSAL SERVICE
- CERTIFIED COLLECTION SITE AT A LOCAL STORE [skip to Q5A]
- ANOTHER COLLECTION SITE (NOT RETAIL STORE) [skip to Q5A]
- A SPECIAL COLLECTION EVENT [skip to Q6A]
- OTHER [SPECIFY] [skip to Q8]
- DON'T KNOW [skip to Q8]
- REFUSED [skip Q8]
- NO MORE ANSWERS

<IF NAPA RESPONDENT LISTS CURBSIDE AS AN OPTION SKIP TO Q4B>

<Q4A_2> Is curbside collection of used motor oil an option in your community?

1. YES
2. NO [skip to Q5A or Q8]

8. DON'T KNOW [skip to Q5A or Q8]
9. REFUSED [skip to Q5A or Q8]

*<*Q4A_2 will capture those respondents in Napa County who do not choose "CURBSIDE COLLECTION PROGRAM" as an option on Q4A*>*

<Q4b> Can you tell me the procedure for using your curbside used oil collection program?
[DO NOT READ ANSWER CHOICES/CHOOSE ALL THAT APPLY]

1. CALL TO GET CONTAINER
2. CALL TO REQUEST PICKUP
3. PUT OIL AT CURB
4. OTHER [SPECIFY]

8. DON'T KNOW
9. REFUSED

<Q4c> When you've changed the oil on your car yourself, how often do you put your used motor oil out for curbside collection? Would you say that you do that. . .

0. Never
1. Rarely
2. Sometimes
3. Often
4. Always

8. DON'T KNOW
9. REFUSED

<Q4c_2> The next time you change the oil on your car, how likely is it that you will put your used oil out for curbside collection?

1. Very Unlikely
2. Unlikely
3. Likely
4. Very Likely

8. DON'T KNOW
9. REFUSED

<Q4d> How often do you think other people you know put their used motor oil out for curbside collection? Would you say that they do that. . .

0. Never
1. Rarely
2. Sometimes
3. Often
4. Always

8. DON'T KNOW
9. REFUSED

<Q4E> The following questions are intended to measure your opinions about the curbside collection program. Please rate the following items:

[PRESS "C" TO CONTINUE]

(Randomized order Q4E_2 through Q4E_5)

<Q4E_2> Using a scale of one to five, where one equals important and five equals unimportant, how would you describe the curbside oil collection program?

-
- 8. DON'T KNOW
 - 9. REFUSED

<Q4E_3> Using a scale of one to five, where one equals easy and five equals difficult, how would you describe the curbside oil collection program?

-
- 8. DON'T KNOW
 - 9. REFUSED

<Q4E_4> Using a scale of one to five, where one equals common and five equals uncommon, how would you describe the curbside oil collection program?

-
- 8. DON'T KNOW
 - 9. REFUSED

<Q4E_5> Using a scale of one to five, where one equals appropriate and five equals inappropriate, how would you describe the curbside oil collection program?

-
- 8. DON'T KNOW
 - 9. REFUSED

<Q4f> How satisfied are you with the existing curbside used oil collection program?

- 1. Extremely Satisfied
- 2. Very Satisfied
- 3. Somewhat Satisfied
- 4. Not at all Satisfied

- 8. DON'T KNOW
- 9. REFUSED

<Q4g> What barriers do you see that might prevent people like yourself from using the curbside used oil collection program?

[DON'T READ OPTIONS: CHECK ALL THAT APPLY]

1. TAKES TOO MUCH EFFORT
2. TAKES TOO MUCH TIME
3. HAVE TO CALL FOR PICK UP
4. DON'T KNOW ABOUT CURBSIDE COLLECTION PROGRAM
5. OTHER [SPECIFY]

8. DON'T KNOW
9. REFUSED
10. NO MORE ANSWERS

<Q4h> Are you served by Upper Valley Disposal Service?

1. YES
2. NO

8. DON'T KNOW
9. REFUSED

<Q5a> (If collection site on 4A) How many miles is the closest used oil collection center from your home? _____

998. DON'T KNOW
999. REFUSED

<Q5b> When you've changed the oil on your car, how often do you take your used motor oil to an oil collection center? Would you say that you do that. . .

0. Never
1. Rarely
2. Sometimes
3. Often
4. Always

8. DON'T KNOW
9. REFUSED

<Q5b_2> The next time you change the oil on your car, how likely is it that you will take your used oil to a collection center?

1. Very Unlikely
2. Unlikely
3. Likely
4. Very Likely

8. DON'T KNOW
9. REFUSED

<Q5c> How often do you think other people you know take their used oil to an oil collection center? Would you say they do that. . .

1. Rarely
2. Sometimes
3. Often
4. Always

5. NEVER
7. DON'T KNOW ANYONE ELSE WHO CHANGES THEIR OWN OIL
8. DON'T KNOW
9. REFUSED

(Randomized order Q4E_2 through Q4E_5)

<Q5c_2> Using a scale of one to five, where one equals important and five equals unimportant, how would you describe the oil collection program?

8. DON'T KNOW
9. REFUSED

<Q5c_3> Using a scale of one to five, where one equals easy and five equals difficult, how would you describe the oil collection program?

8. DON'T KNOW
9. REFUSED

<Q5c_4> Using a scale of one to five, where one equals common and five equals uncommon, how would you describe the oil collection program?

8. DON'T KNOW
9. REFUSED

<Q5c_5> Using a scale of one to five, where one equals appropriate and five equals inappropriate, how would you describe the oil collection program?

-
8. DON'T KNOW
 9. REFUSED

<Q5d> What barriers do you see that might prevent people like yourself from taking their oil to a collection center? [DON'T READ CHOICES/CHECK ALL THAT APPLY]

1. TAKES TOO MUCH EFFORT
2. TAKES TOO MUCH TIME
3. COLLECTION SITE IS TOO FAR
4. OTHER [SPECIFY]

8. DON'T KNOW
9. REFUSED
10. NO MORE ANSWERS

<Q6a> Have you ever disposed of your used motor oil in another way?

1. YES
2. NO [skip to Q7]

8. DON'T KNOW [skip to Q7]
9. REFUSED [skip to Q7]

<Q6b>(If yes to 6a) How did you dispose of your used motor oil? [Open]

<Q7> Are there any other ways that other people you know dispose of their used motor oil? [OPEN]

<Q8> The last time you changed your oil, how did you dispose of your used motor oil?

[DO NOT READ ANSWER CHOICES]

1. THROW IT IN THE TRASH
2. POUR IT DOWN A DRAIN
3. POUR IT ON THE GROUND
4. KEEP IN CONTAINER AT HOME
5. CERTIFIED COLLECTION SITE (AT A LOCAL STORE)
6. ANOTHER COLLECTION SITE (NOT RETAIL STORE)
7. CURBSIDE COLLECTION/UPPER VALLEY DISPOSAL SERVICE
8. OTHER [SPECIFY]

98. DON'T KNOW
99. REFUSED

<Q9> In the past year, have you seen or read any information about recycling used motor oil?

1. YES
0. NO [skip to T3]

8. DON'T KNOW [skip to T3]
9. REFUSED [skip to T3]

<Q9a>(If yes to question 9) What was your source of information for recycling used motor oil?
[DON'T READ ANSWER CHOICES]

1. RADIO
2. NEWSPAPER
3. PUBLIC EVENT
4. BILL INSERT (WATER, TRASH or DISPOSAL COMPANY)
5. BILLBOARD
6. HOUSEHOLD HAZERDOUS WASTE (HHW) EVENT
7. OTHER [SPECIFY]

8. DON'T KNOW
9. REFUSED
10. NO MORE ANSWERS

<T3> These last few questions are for demographic purposes only.

<QD1> What is your postal zip code? _____

<QD2> Do you own your own home?

1. YES
0. NO

- 8. DON'T KNOW
- 9. REFUSED

<QD3> How many years have you lived at your current residence? _____
[ENTER 99 FOR REFUSED]

<QD4> In what year were you born? 19__

<QD5> What is your highest level of education?

- 1. Less than high school
- 2. High school graduate
- 3. Some college (Tech/Voc School/2-Year Degree)
- 4. College graduate
- 5. Post college graduate education

- 8. DON'T KNOW
- 9. REFUSED

<QD6A> Are you of Hispanic or Latino Origin?

- 0. NO
- 1. YES

- 8. DON'T KNOW
- 9. REFUSED

<QD6B> How would you describe your racial background?

- 1. HISPANIC OR LATINO
- 2. BLACK OR AFRICAN AMERICAN
- 3. ASIAN AMERICAN OR PACIFIC ISLANDER
- 4. WHITE
- 5. NATIVE AMERICAN
- 6. OTHER**

- 8. DON'T KNOW
- 9. REFUSED

<QD7a> Is your total annual household income \$50,000 or more?

- 0. NO
- 1. YES (SKIP TO QD8)

8. DON'T KNOW (SKIP TO QCOM)
9. REFUSE (SKIP TO QCOM)

<QD7b> I am going to list some income categories please stop me when I reach the category that best describes your total annual household income before taxes. Would it be...

1. Less than \$10,000
2. \$10,000 to under \$15,000,
3. \$15,000 to under \$25,000,
4. \$25,000 to under \$35,000, or
5. \$35,000 to under \$50,000

8. DON'T KNOW
9. REFUSE

(SKIPTO QCOM)

<QD8> I am going to list some income categories, please stop me when I reach the category that best describes your total annual household income before taxes. Would it be...

1. \$50,000 to under \$75,000,
2. \$75,000 to under \$100,000,
3. \$100,000 to under \$150,000, or
4. \$150,000 and above

8. DON'T KNOW
9. REFUSE

<QCOM> Those are all of the questions I have for you. Do you have any additional comments you would like to make about any of the topics that we covered? [OPEN]

<QEND> Thank you for your time and assistance. Good Bye.

<QGEN> INTERVIEWER: RECORD RESPONDENT GENDER:

1. MALE
2. FEMALE

3. UNSURE

<QCOPPER>

How cooperative was the respondent?

1. VERY COOPERATIVE
2. SOMEWHAT COOPERATIVE
3. SOMEWHAT UNCOOPERATIVE
4. VERY UNCOOPERATIVE

<QUNDR>

In general, how well did the respondent understand the questions?

1. VERY WELL
2. FAIRLY WELL
3. NOT SO WELL
4. NOT WELL AT ALL

<QNOTQAL1>

I'm sorry for bothering you but our study requires that we speak with car owners. Thank you for your time. Goodbye.

<NOCHANGE>

I'm sorry for bothering you today but our study requires that we speak to people who have changed the oil in car(s) in the past year. Thank you so much for your time. Goodbye.

<NOTDIY>

I'm sorry for bothering you today but our study requires that we speak to people who change their own oil in their car(s). Thank you so much for your time. Goodbye.

Appendix B

The Social Desirability of Proper Oil Disposal

Survey data presented in this report show that 10% of DIY respondents report improper disposal of used oil. Other studies on this topic have reported similar findings. However, there is a strong element of social desirability in these responses, and it's likely that some respondents are reluctant to report improper disposal. A recent CIWMB report prepared by researchers at San Francisco State University found that 8% of respondents would admit to improper disposal, but an additional 17% were suspected of improper disposal based on response patterns. In an effort to assess the social desirability of proper oil disposal, we undertook a small study of DIYers.

Previous research has suggested that adding the element of anonymity to a study helps to reduce participant response bias to socially desirable behaviors (Bishop & Fisher, 1995; Ong & Weiss, 2000). Bishop and Fisher (1995) demonstrated this effect in a controlled exit-poll experiment on Election Day, and Ong and Weiss (2000) tested the effect of anonymity on reported cheating behavior among students. The results from both studies showed that participants were much more likely to report socially undesirable behaviors in the context of *anonymous* testing conditions than in confidential ones. For example, Ong and Weiss (2000) found that 50% more students admitted to cheating when under anonymous conditions, than under confidential conditions (24% admitted under confidentiality and 74% admitted under anonymity).

In the current study, we used an anonymous testing procedure to estimate the amount of underreporting of improper disposal of used motor oil by "Do-It-Yourself" oil changers (DIYers).

Methods

Participants

A random sample of 141 customers at a Kragen Automotive store located in Escondido, California participated in this study. Among the sample, 135 customers reported changing their own motor oil. Participants were compensated with a \$5 Kragen Auto Parts gift certificate for participating.

Measures

A 2-page questionnaire was developed to measure attitudes, subjective norms, perceived behavioral control and intentions to properly dispose of used motor oil. The main item for this study asked: "In the past year, how many times have you personally changed the oil on one of your vehicles? (please list the number of times you have changed the oil yourself—do not count times when another person, or oil change service has done it for you)." We then asked, "For each of the times you have changed your oil yourself, what did you do with the used oil afterward?" Response options were:

- *retail collection center (like Kragen),*
- *a waste collection event,*
- *poured it on the ground,*
- *threw it in the trash,*
- *poured it down a drain,*
- *stored it for later disposal,*
- *gave it to a mechanic or service center*
- *other (specify)*

Responses of *poured it on the ground, threw it in the trash, and poured it down the drain* were coded as improper disposals. “Other” responses were coded into the appropriate categories, and in most cases were improper methods (e.g., “used on cattle to prevent mange” or “poured on dirt roads to prevent dust”).

Procedures

After providing informed consent, participants completed the questionnaire. They were instructed that their responses were confidential and that their honest answers would be appreciated. After completing the confidential survey and a short distracter task, participants were then asked to complete an anonymous version. To ensure that the customers understood that their responses would be anonymous, the researcher said, “It is very important to my research to learn the truth about used oil. Please answer the following questions truthfully. You can write your answers on this sheet of paper, fold it, and put it in the box. No one will know what you wrote.” Responses were written a 1/4 sheet and placed anonymously in a large jar.

Results

When respondents provided confidential responses, 9 of the 135 participants (7%) reported at least one improper disposal in the past year. Specifically, 3 respondents (2%) reported pouring their used motor oil on the ground, 8 (6%) reported throwing their used motor oil in the trash, and 0% reported pouring their used motor oil down the drain. Of the 771 oil changes reported, 42 (5%) were reported as improper disposals. Of these, 11 (1.4%) were poured on the ground, 31 (4%) were thrown in the trash, and 0 were poured down a drain.

In contrast, when asked to provide anonymous responses, 17 of the 135 participants (13%) reported at least one improper disposal in the past year. Of the total sample, 11 (8%) reported pouring their used motor oil on the ground, 14 (10%) reported throwing their used motor oil in the trash, and 1 (1%) reported pouring their used motor oil down the drain. Of the total number of oil changes reported, 11% were reported as improper disposals; 2.8% were poured on the ground, 7.4% were thrown in the trash, and .5% were poured down a drain.

<i>Measure of Improper Disposal</i>	<i>Confidential</i>	<i>Anonymous</i>
Percentage of sample reporting at least one improper disposal in past year	7%	13%
Percentage of oil changes in past year with improper disposal	5%	11%
- Percentage of oil changes thrown in the trash	4%	7%
- Percentage of oil changes poured on the ground	1%	3%
- Percentage of oil changes poured down a drain	0%	1%
Percentage of sample reporting proper disposal every time they changed their oil.	93%	87%
Percentage of changes in the past year with proper disposal	95%	89%

Discussion

Our estimates using traditional confidential methods of inquiry are that 7% of DIYers reported at least one improper disposal in the past year. This number is similar to the 8% reported by SFSU and 10% reported in this report. However, when asked in the context of anonymity, the percentage of DIYers whom reported improper disposals increased to 13%, and 11% of the total oil changes. While the amount of underreporting may appear small, it is important to point out that nearly twice as many respondents reported improper disposals when asked anonymously.

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