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The effect of a patient–provider educational intervention to reduce at-risk drinking on changes in health and health-related quality of life among older adults: the Project SHARE study

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ABSTRACT

Background: At-risk drinking, defined as alcohol use that is excessive or potentially harmful in combination with select comorbidities or medications, affects about 10% of older adults in the United States and is associated with higher mortality. The Project SHARE intervention, which uses patient and provider educational materials, physician counseling, and health educator support, was designed to reduce at-risk drinking among this vulnerable population. Although an earlier study showed that this intervention was successful in reducing rates of at-risk drinking, it is unknown whether these reductions translate into improved health and health-related quality of life (HRQL).

Objective: The aim of this study was to examine changes in health and HRQL of older adult at-risk drinkers resulting from a patient–provider educational intervention.

Research design: A randomized controlled trial to compare the health and HRQL outcomes of patients assigned to the Project SHARE intervention vs. care as usual at baseline, 6- and 12-months post assignment. Control patients received usual care, which may or may not have included alcohol counseling. Intervention group patients received a personalized patient report, educational materials on alcohol and aging, a brief provider intervention, and a telephone health educator intervention.

Subjects: Current drinkers 60 years and older accessing primary care clinics around Santa Barbara, California (N = 1049).

Measurements: Data were collected from patients using baseline, 6- and 12-month mail surveys. Health and HRQL measures included mental and physical component scores (MCS and PCS) based on the Short Form-12v2 (SF-12v2), the SF-6D, which is also based on the SF-12, and the Geriatric Depression Scale (GDS). Adjusted associations of treatment assignment with these outcomes were estimated using generalized least squares regressions with random provider effects. Regressions controlled for age group, sex, race/ethnicity, marital status, education, household income, home ownership and the baseline value of the dependent variable.

Results: After regression adjustment, the intervention was associated with a 0.58 point (95% CI: –0.06, 1.21) increase in 6-month MCS and a 0.14 point (95% CI: 0.01, 0.26) improvement in 12-month GDS score, compared to the control group. The intervention also increased adjusted SF-6D scores by 0.01 points at both 6 and 12 months (6-month 95% CI: 0.01, 0.02; 12-month 95% CI: 0.01, 0.01).

Conclusions: Despite the previously shown effectiveness of the Project SHARE intervention to reduce at-risk drinking among older adults, this effect translated into effects on health and HRQL that were statistically but not necessarily clinically significant. Effects were most prominent for patients who received physician discussions, suggesting that provider counseling may be a critical component of primary care-based interventions targeting at-risk alcohol use.

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1. Introduction

At-risk drinking, or drinking that puts individuals at high risk for developing alcohol use disorder, is currently defined by the National Institute on Alcohol Abuse and Alcoholism (NIAAA, 2015). According to this threshold, approximately 3% of female and 10% of male older adults are defined as at-risk drinkers (Breslow, Faden, & Smothers, 2003; Kirchner et al., 2007; Merrick et al., 2008). However, older adults face additional risks associated with drinking because of age-related physiological changes that increase blood alcohol levels for a given dose, increased brain sensitivity to alcohol and increases in morbidity and medication use (Linnola, Erwin, Cleveland, Logue, & Gentry, 1978; Moore, Whiteman, & Ward, 2007; Vestal et al., 1977). Using a definition of at-risk drinking that includes alcohol use that is excessive or potentially harmful in combination with select comorbidities or medications, 3% of women and 18% of men 60 years and older have been defined at-risk drinkers in a population-based sample of U.S. adults (Moore et al., 2006). Further, it affects 35% of older adults who use alcohol, and is associated with higher mortality (Barnes et al., 2010; Moore et al., 2006).

At-risk drinking among older adults is also associated with health problems like hypertension, accidental injury, dementia and depression (Bakhshi & While, 2014). However, alcohol use has mixed effects on health and health-related quality of life (HRQL), which are self-reported measures of physical, social and mental well-being (Centers for Disease Control and Prevention, 2011). Some of the extant literature finds that alcohol consumption—in some cases, even heavy drinking—is associated with improved physical HRQL compared to no alcohol consumption (Valencia-Martin, Galán, Guiller-Castillón, & Rodríguez-Arteaga, 2013), while others indicate no (Martinez, Lien, Landheim, Kowal, & Clausen, 2014) or negative association between alcohol use and HRQL (Chen & Lien, 2003). Few studies focus on older adults, and it is unknown whether this translates into improved health and HRQL.

2. Methods

2.1. Setting

The study population was drawn from Sansum Clinic, a community-based group practice with seven clinics in the Santa Barbara, California area. The practice has a strong primary care base, with service lines representing all major specialties and sub-specialties appropriate for elder care (e.g., cardiology, diabetes, geriatrics, urology).

2.2. Recruitment

A detailed figure of participant flow through Project SHARE can be found in Appendix 1. Of the 42 primary care physicians approached, 31 agreed to participate in the study (n = 20 male, 11 female, 17 internal medicine, 14 family practice). The percentages of physicians who were internal medicine vs. family practice looked almost identical among participating and non-participating physicians. However, female physicians were more likely than male physicians to participate in the study, as were younger physicians. The mean age of participating physicians was 48.3 for physicians in the intervention group and 44.4 for the control physicians, compared with a mean age of 52.5 years for non-participating physicians.

Clinic information technology personnel identified all adults 60 and older who were current patients of these providers (n = 12,573). Providers initially screened out 2159 patients who had severe cognitive impairment, were terminally ill or deceased, were moving to a skilled nursing facility or out of the area within the next year, did not speak English, were no longer a patient of the physician, or other (e.g., physician preference, personal reasons). Of the remaining patients, 9476 were mailed recruitment letters. Of these, 2557 were not screened either because they actively refused, never responded to a call (passively refused), or staff had the incorrect contact information. Among the 6919 who were screened, 4217 patients agreed to participate, met the inclusion criteria (i.e., consumed at least one drink containing alcohol in the past 3 months, planning to live in the area for 12 months, not cognitively impaired, spoke English, not deceased, not too ill), and were mailed a baseline survey. Of the 3529 subjects who returned baseline surveys, 1186 were identified as at-risk drinkers and eligible for the intervention phase of the study.

At-risk patients were assigned to the intervention or control group based on the random assignment of their primary care physician. Of the 546 patients assigned to the intervention group and completing the baseline survey, 79 did not complete either the 6- or 12-month survey, 28 completed only the 6-month survey, 14 completed only the 12-month survey, and 425 completed both the 6- and 12-month surveys. The control group was composed of 640 patients. Among patients assigned to the control group and completing the baseline survey, 15 did not complete either the 6- or 12-month survey, 15 completed only the 6-month survey, 5 completed only the 12-month survey, and 605 completed both the 6- and 12-month surveys. Patients who screened as likely dependent drinkers at baseline (7 or more drinks daily) were excluded from the study and their physicians were notified. Patients who met this criterion at follow-up were not dropped from the study but their physicians were notified, regardless of whether the patient was in the experimental or control group (further information on enrollment and retention can be found in Ettnet et al. (2014)).
2.3. Intervention

Older participants’ risk status was ascertained using the Comorbidity Alcohol Risk Evaluation Tool, or CARET (Barnes et al., 2010). The CARET, an updated and revised version of the short Alcohol-Related Problems Survey (Fink et al., 2002), uses information on amount of alcohol use, comorbidity, symptoms and medications to assess drinking risks among older adults. The face, content, and criterion validity for the CARET have been previously established (Moore, Beck, Babor, Hays, & Reuben, 2002; Moore, Hays, Reuben, & Beck, 2000; Oishi et al., 2001).

Control patients received usual care, which may or may not have included alcohol counseling. All intervention group patients received a personalized Patient Report that included educational information on alcohol and aging, a drinking diary, and tips based on the patient’s alcohol risks identified in the CARET at baseline and 6 months. Provider reports at baseline and 6 months based on results from an intervention patient’s CARET were also generated. Providers were given the reports immediately before each upcoming visit throughout the 12-month follow-up and asked to discuss the risk factors identified in the report with their patients. Among the intervention patients, 300 received at least one provider discussion (Duru et al., 2015). In addition, telephone health educators contacted intervention patients 2 weeks after sending the baseline patient report, 3 months after sending the baseline patient report and 2 weeks after sending the 6-month patient report (more details on the intervention can be found in Ettruer et al. (2014)).

The SHARE intervention used PRECEDE-PROCEED, a coordinated approach to program development and evaluation (Gienlen & McDonald, 1997), as the conceptual framework for evaluating the effectiveness of our intervention. PRECEDE (Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation) is an educational diagnosis model developed in the 1970s. PROCEED (Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development) was added in 1991. Although not a theory itself, PRECEDE-PROCEED provides a framework for applying theories to program development and evaluation (Gienlen & McDonald, 1997; Glanz, Lewis, & Rimer 1997). The theories adapted in this research are diffusion of innovations theory, with its focus on characteristics of innovations (Green & Lewis, 1986; Green, Gottlieb, & Parcel, 1987), and the Behavioral Model for Vulnerable Populations (Gelberg, Andersen, & Leake, 2000). The PRECEDE-PROCEED framework has proven to be useful and effective over a relatively long time in a variety of studies to change risky health behavior (Howat, Jones, Hall, Cross, & Stevenson, 1997; Keith & Doyle, 1998).

2.4. Measures

Health and HRQL outcomes included those measuring mental and physical health, as well as a global measure of HRQL. Mental and physical component scores (MCS and PCS) were based on the Short Form-12v2 (SF-12v2) (Ware, Kosinski, Turner-Bowker, & Gandek, 2002), as was the measure of overall HRQL, the SF-6D (Maki, Brouwer, Koopmanschap, Stolk, & Nieboer, 2014). The SF-12 is a validated metric in which higher scores represent better quality of life (Ware, Kosinski, & Keller, 1996). MCS and PCS scores range from 0, the worst possible health state, to 100, the best possible health state. Unlike the MCS and PCS, the SF-6D represents preference-weighted HRQL (i.e., utility scores) and ranges from 0 to 1. The SF-6D is widely used and was included in the SF-12 in the 2012-13 follow-up. The SF-6D was reverse coded, and ranged from 0 to 1. Higher scores indicate fewer depressive symptoms.

2.5. Data analysis

Descriptive and bivariate analyses were based on data from participants participating in the intervention phase of the study and completing the baseline, 3-, 6-, and 9-month follow-up surveys (N = 1049). Adjusted associations of treatment assignment with health and HRQL outcomes were estimated using generalized least squares regressions with random provider effects. Regressions controlled for treatment assignment and HRQL only or for age group, sex, race/ethnicity, marital status, education, household income, home ownership and the baseline value of the dependent variable, except for the 12-month GDS regression, which controlled instead for baseline MCS. Our analytic sample in our adjusted analyses ranges from 953 to 1015 depending on the completeness of the outcome data. Multiple imputation was used to test the sensitivity of our main results to missing data. All statistical analyses were computed using Stata Version 10.1 (StataCorp, 2007).

3. Results

3.1. Sample characteristics

Just under half (46.0%) of the participants were in the intervention group (Table 1). Similar proportions of participants were at risk due to alcohol behaviors (61.2%), alcohol plus medications (60.7%), and alcohol plus symptoms (61.3%). Our sample was nearly two-thirds male (65.7%), predominantly non-Latino (94.1%) and white (97.3%). Most owned their homes (88.3%) and were married (76.2%). More than half completed college or graduate school (59.4%), 50.0% were 60–69 years old, and nearly half (47.1%) had household incomes of $80,000 or more per year.

Significant baseline differences between treatment groups were found only for gender (p = 0.03), marital status (p = 0.01) and income (p = 0.02). No significant differences were found between intervention and comparison groups for alcohol risk factors, race, ethnicity, education, age, or home ownership. Importantly, the baseline values of the outcome measures also did not vary significantly between the intervention and control groups.

Among participants, the average baseline PCS score was 48.9 (standard deviation 9.5) (Table 2). The mean MCS scores for this group at baseline was 44.4 (6.7). PCS and MCS scores for the general U.S. adult population have a mean at 50 and a standard deviation of 10 (Barnes, Robert, & Bradley, 2014), so these scores among our sample of older at-risk drinkers are not atypical. The average SF-6D score at baseline was 0.66 (0.11), suggesting our sample was below the U.S. average score of approximately 0.77 for adults over age 65 (Fryback et al., 2007). Participants scored a 4.4 (1.1) out of 5 on the GDS returned with the 12-month survey indicating that the average participant had few, if any, depressive symptoms. We found no unadjusted differences between the intervention and control group in measures of health and HRQL at baseline.

3.2. Associations of the at-risk drinking intervention with the outcomes controlling for baseline health and HRQL only

After adjusting for the baseline value of the outcome variable only, the Project SHARE intervention was not significantly associated with 6-month PCS scores (Table 3). The at-risk drinking intervention was associated with a 0.56 point (95% CI: 0.06, 1.06) increase in 6-month MCS scores and a 0.01 point increase in 6-month SF-6D scores (95% CI: 0.01, 0.01). No significant associations were found between the Project SHARE intervention and changes in health and HRQL between baseline and the 12-month follow-up.

3.3. Associations of the at-risk drinking intervention with the outcomes controlling for risk factors, demographics and baseline health and HRQL

After adding controls for risk factors and demographics, the intervention remained unassociated with changes in 6- or 12-month PCS scores (Table 3). However, receiving the at-risk drinking intervention was associated with modest improvements in MCS scores. Specifically,
Assignment to treatment group was associated with a 0.58 point (95% CI: −0.06, 1.21) increase in 6-month MCS, although this association was only marginally significant (p < 0.10).

Intervention effects on global HRQL and measures of geriatric depression were more robust. Compared to those receiving usual care, older adults in the treatment group reported a 0.01 point increase in SF-6D scores at both 6 and 12 months (6-month 95% CI: 0.01, 0.02; 12-month 95% CI: 0.01, 0.01). Older adults receiving the Project Share intervention also had a 0.14 point (95% CI: 0.01, 0.26) improvement in their 12-month GDS score, compared to those receiving usual care, suggesting they endorsed fewer depressive symptoms.

Importantly, our previous work has found the effectiveness of Project SHARE on reducing at-risk drinking among older adults varies by the intervention components received (Duru et al., 2015). Additional analyses of the association of the intervention components with health and HRQL (not shown) find evidence consistent with the earlier results for at-risk drinking; improvements in SF-6D scores associated with the intervention were primarily driven by whether patients engaged in an alcohol-related discussion with their physician at any time during the 12-month follow-up period rather than the health educator component of the intervention. However, changes in MCS and GDS associated with the Project SHARE intervention did not differ by receipt of a physician discussion. The physician component of the intervention may have been more important than the health educator component because it began at each subject’s baseline and continued for the full 12-month follow-up period. The health educators, as noted earlier, spoke to patients via telephone on three occasions between receiving the baseline and 6-month follow-up period. The physician component of the intervention may have been more important than the health educator component because it began at each subject’s baseline and continued for the full 12-month follow-up period.

### Table 1

Baseline characteristics of older at-risk drinkers in the Project SHARE study.

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Overall (N = 1049)</th>
<th>Intervention (n = 439)</th>
<th>Control (n = 610)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 to 64</td>
<td>21.6</td>
<td>19.6</td>
<td>23.3</td>
<td>0.08</td>
</tr>
<tr>
<td>65 to 69</td>
<td>28.4</td>
<td>29.3</td>
<td>27.7</td>
<td></td>
</tr>
<tr>
<td>70 to 74</td>
<td>19.1</td>
<td>16.9</td>
<td>20.9</td>
<td></td>
</tr>
<tr>
<td>75 to 79</td>
<td>16.2</td>
<td>18.3</td>
<td>14.4</td>
<td></td>
</tr>
<tr>
<td>80 and older</td>
<td>14.8</td>
<td>15.9</td>
<td>13.8</td>
<td></td>
</tr>
<tr>
<td>Own home</td>
<td>88.3</td>
<td>88.6</td>
<td>88.1</td>
<td>0.77</td>
</tr>
</tbody>
</table>

### Table 2

Baseline, 6- and 12-month outcomes of older at-risk drinkers in the Project SHARE study.

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Overall Mean (SD)</th>
<th>Intervention Mean (SD)</th>
<th>Control Mean (SD)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical component score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>48.9 (9.5)</td>
<td>48.9 (9.7)</td>
<td>48.8 (9.3)</td>
<td>0.93</td>
</tr>
<tr>
<td>6 month</td>
<td>50.1 (8.7)</td>
<td>50.3 (9.0)</td>
<td>50.0 (8.4)</td>
<td>0.54</td>
</tr>
<tr>
<td>12 month</td>
<td>49.8 (8.8)</td>
<td>49.8 (8.8)</td>
<td>49.9 (8.8)</td>
<td>0.88</td>
</tr>
<tr>
<td>Mental component score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>44.4 (6.7)</td>
<td>44.5 (6.6)</td>
<td>44.3 (6.7)</td>
<td>0.68</td>
</tr>
<tr>
<td>6 month</td>
<td>43.9 (6.9)</td>
<td>44.2 (7.2)</td>
<td>43.6 (6.6)</td>
<td>0.14</td>
</tr>
<tr>
<td>12 month</td>
<td>43.9 (6.8)</td>
<td>44.0 (6.7)</td>
<td>43.8 (6.9)</td>
<td>0.61</td>
</tr>
<tr>
<td>SF-6D</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>0.66 (0.11)</td>
<td>0.66 (0.11)</td>
<td>0.66 (0.11)</td>
<td>0.35</td>
</tr>
<tr>
<td>6 month</td>
<td>0.66 (0.11)</td>
<td>0.66 (0.11)</td>
<td>0.66 (0.11)</td>
<td>0.15</td>
</tr>
<tr>
<td>12 month</td>
<td>0.66 (0.11)</td>
<td>0.66 (0.11)</td>
<td>0.66 (0.11)</td>
<td>0.45</td>
</tr>
<tr>
<td>Geriatric Depression Scale</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 month</td>
<td>4.4 (1.1)</td>
<td>4.4 (1.0)</td>
<td>4.3 (1.1)</td>
<td>0.36</td>
</tr>
</tbody>
</table>

### Table 3

Adjusted intervention effects on older at-risk drinkers’ health and health-related quality of life (HRQL).

<table>
<thead>
<tr>
<th>Health and HRQL outcomes</th>
<th>6 months</th>
<th>12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical component score (PCS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control for baseline PCS only</td>
<td>0.25 (−0.67, 1.17)</td>
<td>−0.13 (−0.94, 0.68)</td>
</tr>
<tr>
<td>Control for baseline PCS, risk factors, and demographics</td>
<td>0.33 (−0.51, 1.17)</td>
<td>0.06 (−0.61, 0.72)</td>
</tr>
<tr>
<td>Mental component score (MCS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control for baseline MCS only</td>
<td>0.56** (0.06, 1.06)</td>
<td>0.15 (−0.60, 0.90)</td>
</tr>
<tr>
<td>Control for baseline MCS, risk factors, and demographics</td>
<td>0.58* (−0.06, 1.21)</td>
<td>0.16 (−0.56, 0.88)</td>
</tr>
<tr>
<td>SF-6D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control for baseline SF-6D only</td>
<td>0.01*** (0.01, 0.01)</td>
<td>0.01 (−0.01, 0.01)</td>
</tr>
<tr>
<td>Control for baseline SF-6D, risk factors, and demographics</td>
<td>0.01** (0.01, 0.02)</td>
<td>0.01 (0.01, 0.02)</td>
</tr>
<tr>
<td>Geriatric Depression Scale (GDS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control for baseline MCS only</td>
<td>0.07 (−0.05, 0.20)</td>
<td>0.95</td>
</tr>
<tr>
<td>Control for baseline MCS, risk factors, and demographics</td>
<td>0.14** (0.01, 0.26)</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1The Geriatric Depression Scale was reverse coded so that higher values indicated fewer depressive symptoms. Regression models controlled for either: (1) only the baseline value of the dependent variable (with the exception of the Geriatric Depression Scale regression, which controlled for baseline MCS score instead), as well as the baseline value of the dependent variable (with the exception of the Geriatric Depression Scale regression, which controlled for baseline MCS score instead).

** p < 0.10.

*** p < 0.05.

### 4. Discussion

Despite the previously shown effectiveness of the Project SHARE intervention in reducing at-risk drinking and health services use among older adults (Etter et al., 2014), effects on health and HRQL were statistically but not necessarily clinically significant. These null findings may...
have arisen from at least two characteristics of our study. First, the pa-
tients participating in the study were in good health generally and
d there may have been little room for the intervention to improve
some measures of health and HRQL outcomes. Additionally, it is likely
a 12-month follow-up is too brief a duration for some of the health
and HRQL outcomes of interest to be influenced by the at-risk drink-
ing intervention.

The significant intervention effects found for the global measure of
health-related quality of life were driven by receiving a physician dis-
cussion, suggesting that access to physicians who can provide alcohol
counseling may be an important component of the intervention. This
is consistent with other research suggesting that brief interventions in
primary care are effective in reducing alcohol use, (Berhote, Daeppen,
Wietlisbach, Fleming, & Burnand, 2005), especially among older adults
(Fleming, Manwell, Barry, Adams, & Stauffacher, 1999; Gordon et al.,
2003). However, the size and type of the effects vary widely among
these primary care interventions (Fleming et al., 1999; Moore et al.,
2011) and may depend on factors like ethnicity, gender, education,
baseline risk (Lin, Karno, Tang et al., 2010), and perception of physician
advice (Lin, Karno, Barry et al., 2010).

We experienced several initial barriers/facilitators to implementa-
tion of the Project SHARE intervention. First, when asked to partici-
pat e, the physicians expressed concerns about the time it would take to
go over the personalized patient report with patients in the treatment
group. However, after incorporating the patient report into the appoint-
ment, participating physicians found the report valuable and felt that
it did not noticeably constrain their ability to discuss other medical
concerns during a patient’s visit.

Second, the research staff at the collaborating clinic also had
some initial concerns about the training time and effort that would be
required in order to use the online patient recruitment and tracking
system. After becoming more familiar with the system and its advant-
ge s, however, they concurred that the online system was more effi-
cient and training with the new system proceeded relatively quickly.
The online tracking system facilitated implementation of the interven-
tion and research evaluation by making recruitment, retention and
tracking of the intervention and survey data collection activities easier
and more reliable than would otherwise have been possible, for exam-
ple if Excel spreadsheets and Outlook calendars had been used for pa-
tient tracking. The online system also enabled the project director to
monitor the research staff and health educators long-distance, saving
project resources.

Finally, our initial recruitment plan targeted patients with an up-
coming physician visit within the next month to enroll; furthermore,
we only had enough resources to recruit a subsample of the total eligible
patient population. An increase in the resources for data collection
enabled us to change the recruitment strategy so that we were able
to attempt data collection on the entire eligible population, randomly
selecting a subsample each month. The advantage of the new recruit-
ment strategy was that it allowed us to avoid sample selection bias
(e.g., recruiting only individuals who were frequent/high utilizers).

When interpreting our findings, several limitations to our study
are worth noting. First, our estimates may not generalize beyond our
sample. Compared to the U.S. Census population over 60, our sample
was more likely to be white, married, well-educated, and higher-
income (U.S. Census Bureau, 2006). However, increased access to
primary care resulting from recent coverage expansions among lower-
socioeconomic populations may result in larger provider-based alcohol
intervention effects if individuals with previously poor access to pro-
viders benefit more from additional care than patients who already
had good healthcare. While we do not have any information about the
reasons for withdrawal, we suspect from anecdotal reports that partic-
pants dropped out because they did not want to talk about their alcohol
use. We empirically examined the correlates of dropping out between
baseline and 12 months by estimating a regression of the predictors of
dropout, including treatment assignment and all of the covariates listed
in Table 1 of the manuscript. We find that the only indicator that is significantly correlated with dropout is assignment to the intervention group.

Further, selection bias based on unobservable differences in the in-
tervention and control groups that may be correlated with participation
in the intervention and in health and HRQL is a potential threat to the
validity of our estimates. To assess this bias, we conducted a “worst-
case” analysis similar to Ettner et al. (2014), by “imputing” a conserva-
tive value for 12-month HRQL outcomes to individuals who drop out
of the sample in order to include them in the analysis. For each individ-
ual who dropped out of the sample, we took the baseline value of that
individual’s HRQL and adjusted it by the average percent change be-
tween baseline and follow-up HRQL among control group participants.
This adjusted value was then assigned as the follow-up HRQL value.
(If t-tests showed that changes over time among the control group
were non-significant, we instead assigned the baseline value without
any adjustments.) Estimates from these analyses were quantitatively
similar to the original estimates, suggesting that potential bias due
to unobservables correlated with intervention participation and
health and HRQL outcomes was not a major threat to the consistency of
our estimates.

Additionally, our study period may have been too short to allow im-
provements in health and HRQL to develop. The changes in at-risk
drinking resulting from the Project SHARE intervention may require
a longer time horizon to translate into improved health and HRQL. Studies
of HRQL improvements after alcohol dependence treatment show gains
after long (e.g., 12 months) and short time horizons, but these studies
also used an alcohol-dependent population (Donovan et al., 2005;
Kraemer et al., 2002). Few studies appear to follow seniors past 12
months; this is an important area for future research.

In summary, our results suggest that interventions to reduce at-risk
drinking among older adults that include a provider component are
modestly effective at improving health and HRQL. Given the limited
evidence on how best to integrate behavioral health treatment with
primary care to improve the physical and mental health of older adults,
our findings offer an important contribution. One “take-home message”
is that it may take longer than the typical timeline of most intervention
studies to see changes in behaviors (in our case, at-risk drinking) trans-
late into changes in health and health-related quality of life; in turn, this
suggests that intervention studies may miss important effects if the
evaluation does not include intermediate outcome measures. With
the expansion of coverage for behavioral health conditions resulting
from recent U.S. health reforms such as the Affordable Care Act and
the Mental Health Parity and Addiction Equity Act, future inquiry
assessing the effectiveness of provider-based behavioral health inter-
ventions is needed.

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ducted. This study is registered as a clinical trial with ClinicalTrials.gov
Identifier: NCT00107640.
Appendix 1. Participant Flow through Project SHARE

| 12,573 Patients identified from administrative data; 3097 not mailed a recruitment letter |
| 2159 Excluded by participating physician |
| 592 Cognitive impairment |
| 449 No longer a patient of the physician |
| 205 Moving out of the area |
| 204 Abstainer |
| 155 Deceased |
| 130 Moved to a skilled nursing facility |
| 122 Terminal illness |
| 106 Not English speaking |
| 92 Other ineligibility, e.g., poor health |
| 635 Participating physician left clinic prior to mailing |
| 303 Research staff never mailed letter |

| 3529 Returned baseline survey |
| 2318 Not-at-risk |
| 18 Drank too much to participate |
| 7 Did not want to participate |

| 1186 Eligible and enrolled patients in intervention phase of study |

| 546 Intervention Patients |
| 62 withdrew |
| 6 Month Survey (484 still in study) |
| 451 Completed (93% of initial sample) |
| 29 Did not return survey |
| 2 Deceased |
| 15 withdrew |
| 12 Months (467 still in study) |
| 439 Completed (90% of initial sample) |
| 25 Did not return survey |
| 1 Too ill |
| 2 Deceased |

| 640 Control Group Patients |
| 5 withdrew |
| 6 Month Survey (635 still in study) |
| 620 Completed (97% of initial sample) |
| 12 Did not return survey |
| 1 Lost contact |
| 2 Deceased at 6-month time period |
| 2 withdrew |
| 12 Months (631 still in study) |
| 610 Completed (95% of initial sample) |
| 15 Did not return survey |
| 1 Lost contact |
| 4 Deceased |
| 1 Too ill |

| 9476 Mailed a recruitment letter |
| 2557 Were not screened |
| 1853 Opted out |
| 434 Never responded to call |
| 370 Incorrect contact |

| 6919 Screened for eligibility |
| 2702 Ineligible for baseline survey |
| 2352 Abstainers |
| 140 Not English speaking |
| 121 Moving out of area |
| 48 Cognitive impairment |
| 33 Deceased |
| 8 Too ill |

| 4217 Eligible for baseline survey |
| 688 Did not complete baseline survey |
| 186 Refused to be sent survey |
| 592 Did not return survey |

References


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