Families, Systems, & Health
2006, Vol. 24, No. 2, 179–194

1091-7527/06/$12.00 DOI: 10.1037/1091-7527.24.2.179

Validation of the "Important Other" Climate Questionnaire: Assessing Autonomy Support for Health-Related Change

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Self-determination theory suggests that autonomy support from others is important in motivating change of various health behaviors. The present research provides initial validation for the Important Other Climate Questionnaire for smoking (IOCQ–S) and for diet (IOCQ–D) in the context of a large (N = 1,006) intensive tobacco treatment and dietary intervention trial. These scales are intended to measure the degree of autonomy support patients experience from important others (non-health care professionals) with respect to tobacco abstinence and eating a healthy diet. Results indicate the measures are reliable (α = .87 smoking and .95 diet) and valid. Important other support was associated with change in perceived autonomy and perceived competence for target behaviors. Further, the IOCQ–S was associated with 7-day point prevalence cessation and 6-month prolonged abstinence from tobacco. The IOCQ–D was associated with a change in the percentage of calories from fat, saturated fat, and monounsaturated fat. Initial reliability and validity are supported for the IOCQ.

Keywords: autonomy support, social support, extra-treatment support, tobacco dependence treatment, dietary change

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This work was supported by grant R01-MH5954 cofunded by the National Institute of Mental Health and the National Cancer Institute and by Grant 5-M01-RR00044 from the National Center for Research Resources to the University of Rochester General Clinical Research Center.

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Family members and important others provide the context in which people manage their chronic diseases and which affects health behaviors that account for about half the mortality in the United States (Mokdad, Marks, Stroup, & Gerberding, 2004). These health behaviors include diet, physical activity, alcohol consumption, and tobacco use. Patients who are trying to quit smoking and whose health care practitioners assist them in arranging extra-treatment support from others (e.g., family, coworkers, or friends) may

have as much as a 50% increase in their 5-month abstinence rates based on the U.S. Public Health Service meta-analysis (Fiore et al., 2000). A second meta-analysis (Park, Schultz, Tudiver, Campbell, & Becker, 2002) identified the fact that partner nagging and criticism were associated with relapse to smoking, but concluded that data were insufficient to recommend partner support interventions in tobacco use. These meta-analyses suggest that theory-guided research with appropriate mediators could help elucidate how extra treatment support influences health outcomes. In this report we outline the validity of a scale for measuring extra-treatment support from important others in the context of diet and tobacco use behavior change.

Self-determination theory (SDT) (Deci & Ryan, 1985; Ryan & Deci, 2000; Sheldon, Williams, & Joiner, 2003; Williams, McGregor, Sharp, Levesque, Kouides, Ryan, & Deci, 2006) is a general theory of motivation that assumes people are innately oriented toward health and growth and that humans have needs for autonomy, competence, and relatedness to other humans. SDT distinguishes between autonomous and controlled motivation. Autonomy involves experiencing a sense of choice and volition as one behaves in a way that is congruent with one's deeply held values. Controlled motivation, in contrast, involves people behaving because of a demand or threat from an external agent (e.g., family member) or from a rigidly held belief that they must behave to avoid guilt or shame. Research has linked autonomous motivation to maintained weight loss (Williams, Grow, Freedman, Ryan, & Deci, 1996), medication adherence (Williams, Rodin, Ryan, Grolnick, & Deci, 1998), reduction in adolescents' tobacco use (Williams, Cox, Kouides, & Deci, 1999), long-term abstinence from smoking (Williams, Gagne, Ryan, & Deci, 2002), and maintained control of diabetes (Williams, Freedman, & Deci, 1998; Williams, McGregor, Zeldman, Freedman, & Deci, 2004), healthy and dysfunctional eating habits for bulimics, and cholesterol for patients at risk for cardiovascular disease (Pelletier, Dion, Slovinec-D'Angelo, & Reid, 2004). SDT further proposes that perceived competence is necessary for behavior change. Perceived competence is similar to self-efficacy (Bandura, 1986) and represents the degree to which people feel able to achieve desired outcomes. It too has been shown to predict smoking and diabetes outcomes (Williams, Gagne, et al., 2002, Williams, Freedman, et al., 1998; Williams et al., 2004). Supporting patient autonomy has been found to increase perceived competence for change (Williams et al., 2004, 2006).

SDT suggests that supporting patients' autonomy by acknowledging their perspective, providing choice, responding to their initiations, providing relevant information, and minimizing control are the bases for increasing or maintaining autonomous motivation over time and indeed that autonomy support may in part be the mechanism through which the effects of social support, broadly construed, are mediated (Ryan & Solky, 1996). Autonomy support from health care practitioners has been shown to facilitate the internalization of autonomy and competence. Autonomy support from other salient authority figures (e.g., parents, supervisors in the work place, teachers, and coaches) has been demonstrated to increase autonomy and competence in many studies, some of which included medical professionals (Williams and Deci, 1996; Williams, Levesque, Zeldman, Wright, & Deci, 2003). It is also likely that autonomy and competence are facilitated by more informal figures that play important roles in our lives. In the present study we investigate the link between autonomy support from patients' nonprofessional relationships and their experience of autonomy and competence for smoking and dietary change.

THE HEALTH CARE CLIMATE QUESTIONNAIRE AND THE IMPORTANT OTHER CLIMATE QUESTIONNAIRE

The Important Other Climate Questionnaire (IOCQ) is derived from the Health

Care Climate Questionnaire (HCCQ; Williams et al., 1996). The HCCQ was developed to assess the perceived autonomy supportiveness of the interpersonal climate created by health care staff with their patients and has been adapted for use in numerous settings. Studies in health care settings have demonstrated that an autonomy-supportive climate is associated with positive outcomes in weight loss and weight maintenance (Patrick, 2004; Williams et al., 1996), medication adherence (Williams, Rodin, et al., 1998), oral health (Halvari, 2004), and dietary adherence and glycemic control (Williams et al., 2004; Senecal, 2004). The HCCQ has also been adapted in other, nonmedical, settings (Blais, 2004; Duda, 2004; Hess, 2004; La Guardia, 2004; Lynch, Plant, & Ryan, 2005; Pelletier, Fortier, Vallerand, & Briere, 2001; Reeve, 2005; Roth, 2004). It has been demonstrated to have adequate reliability, .81 (Pelletier et al., 2001) to .96 (Williams, Rodin, et al., 1998), in the above studies.

The IOCQ bears a conceptual similarity to the Family Care Climate Questionnaire (FCCQ) as both were adapted from the HCCQ. The FCCQ's preliminary validation involved 63 patients with congestive heart failure (Clark & Dunbar, 2003). Clark and Dunbar reported on the development of two versions of the FCCQ, each consisting of 14 items. The patient version (FCCQ–P) measures the patient's perception of the autonomy supportiveness of the family. In the family version (FCCQ–F), a family member rates the autonomy support that he or she provides to the patient. The IOCQ, in contrast, is a 6-item scale that measures the patient's perception of the autonomy supportiveness of an "important other" with respect to an identified health behavior. An important other may or may not be a family member (spouse or parent); for example, a close friend or coworker could be selected by the person as being important to the planned change. Validation of the IOCQ will provide an instrument that is brief (6 items compared with 14) and flexible (the target health behavior is both specific and can be substituted according to need). Two versions, one for smoking cessation (IOCQ–S) and one for diet (IOCQ–D) will be tested herein.

In this report we investigate the psychometric properties of the IOCQ in a cessation–induction trial. Specifically, to determine the measure's reliability, internal consistency will be demonstrated for both the IOCQ–S and the IOCQ–D. Two forms of validity will be tested. Construct validity will be provided by testing the following hypotheses: Autonomy support as assessed by the IOCQ will predict (a) change in autonomous and competence motivation, (b) making a serious quit attempt, (c) use of medications for cessation, (d) 6-month prolonged tobacco abstinence, and (e) dietary outcomes of percentage of calories from fat, percentage of calories from saturated fat, and soluble fiber. Discriminant validity will be provided by demonstrating that the IOCQ predicts a separate variance (above and beyond that of HCCQ) in change in autonomy and competence.

METHODS

Scale Development

As noted, items were developed from an existing scale, the HCCQ (Williams et al., 1996). The original version of the HCCQ consisted of 15 items, but subsequent studies have made use of an abbreviated, 6-item version. Whereas the original HCCQ did not target specific health behaviors, the adapted, 6-item version used in the present study specifically identifies smoking cessation (IOCQ–S) and healthy diet (IOCQ–D) as target behaviors. In addition, the primary referent of the IOCQ–S and IOCQ–D scales has been changed from health care providers to respondent-selected, nonprofessional important others. Each item was rated on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Scores were computed by

averaging responses to the 6 items. (See Tables 2 and 3 for the full scales.)

Study Design

A detailed description of the study has been reported elsewhere (Williams, Minicucci, et al., 2002). In brief, people who smoked 5 or more cigarettes per day, were 18 years of age and older, read and spoke English, had no history of a psychotic illness (depression was allowed), and had a life expectancy of 18 months were recruited through newspaper ads and signs in physician offices to participate in a study about smokers' health. Patients were paid $35 after completing the 6-month questionnaire and would receive another $40 after an 18-month follow-up. Patients were stratified based on whether their low-density lipoprotein cholesterol level was high or not (National Cholesterol Education Program (NCEP), 1997).

Of note, smokers were recruited to participate whether or not they were ready to try quitting or changing their diet (Hughes et al., 2003). All participants had two fasting lipid levels checked at baseline. If their average cholesterol value was above that recommended by the Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel II) (1993) standards they were again randomly assigned to receive community care or dietary intervention. The 6-month intervention for tobacco dependence demonstrated that those randomly assigned to the intensive tobacco dependence intervention based on SDT experienced more autonomy support than those in the community care condition. The results of the trial with respect to change in lipid values are reported in a separate manuscript (Williams et al., in press).

Community Care Condition

Patients randomly assigned to community care completed questionnaires and then received the National Cancer Institute booklet "Clearing the Air," a photocopy of the results of their cholesterol tests, and a list of active smoking cessation programs (including contact information) in the Rochester area. They were encouraged to enroll in one of these programs and were advised to discuss their smoking and cholesterol profile with their physician.

Intervention Condition

Patients in the intervention condition were given the same materials as those in the community care condition, were encouraged to meet with their primary care physician about their cholesterol profile and smoking, and were advised to consider enrolling in other smoking cessation programs in Rochester. They also were asked to meet with one of our trained counselors four times (in person) during the subsequent 6 months, but they could opt for telephone follow-up.

Baseline Assessments

Patients completed questionnaires including demographic information, medical history, and smoking history, the Fagerstrom Addiction Severity Scale (Fagerstrom & Schneider, 1989), the Treatment Self-Regulation Questionnaire (TSRQ) for autonomous motivation (average of two 6-item subscales, one each for cessation and medication taking), the Perceived Competence Scale (PCS, average of 4 items), the HCCQ (15 items), and the IOCQ–S and IOCQ–D (6 items each for smoking and diet), and their intention to quit smoking in the next 30 days. For the HCCQ, patients in the intervention condition were asked to think about the study counselor and physician with whom they met as part of the study. Patients in the community care condition were to think about their primary care provider when responding to these items. Items from the previously validated motivation scales Williams et al., 1999, 2006; Williams, Gagne, et al., 2006) were answered on 7-point Likert-type scales and can been seen at the SDT

Web site (http://www.psych.rochester.edu/SDT/measures/index.html).

One-Month Assessments

Patients were mailed a questionnaire that repeated the TSRQ, PCS, and their intention to quit smoking. It also assessed patient perceptions of their health care practitioner as well as important other autonomy support regarding their tobacco use (HCCQ and IOCQ-S), important other support regarding diet (IOCQ-D), and their current smoking status. Three attempts were made to call the patient, if no response to the initial mailing was received in 2 weeks. A second questionnaire was mailed to everyone who did not return the first within 1 month.

Six-Month Outcomes

Patients were mailed a questionnaire assessing their point prevalence at 6 months with the question "Have you smoked a cigarette, even a puff, in the past 7 days?" If they answered no, they were instructed to call the study coordinator to arrange for a blood sample to be drawn to verify their reported abstinence. Patients also responded to questions about the number of serious quit attempts (24 hours) they had made since they began the study, whether they used medications to try to quit (if so, which ones and for how many days), and the number of days since their last cigarette. Serum cotinine was analyzed to validate the point prevalence report (Pojer et al., 1984). Thus, cessation outcomes reported are the validated 7-day point prevalence at 6 months and 6-month prolonged abstinence (Hughes et al., 2003). Patients were asked to complete the HCCQ, IOCQ–S and IOCQ–D again.

Dietary Recalls and Fasting Lipid Profiles

Three 24-hour dietary recalls were collected and analyzed at baseline, and 6 months using the Nutrition Data System for Research, Version 4.05 (Nutrition Coordinating Center, University of Minnesota, Minneapolis, MN; NCEP, 1997). Dietary recalls were conducted by telephone from trained staff at the Penn State Diet Assessment Center (Pennsylvania State University, University Park, PA) for two weekdays and one weekend day. A multiple-pass technique was used to facilitate dietary recall and to improve the accuracy of dietary data collected (Jonnalagadda et al., 2000). The 2-D Food Portion Visual (Nutrition Consulting Enterprises, Framingham, MA) of cups, spoons, bowls, and various shapes and thicknesses were used by interviewers and participants to estimate portion sizes.

Data Analysis

Descriptive statistics were computed for the scores on the IOCQ–S and IOCQ–D. The internal consistency of both versions of the IOCQ was estimated with the Cronbach alpha statistic and item-to-total correlations for the initial baseline assessment. Internal consistency was assessed again at 1- and 6-month follow-ups. The alpha level was set at $p \leq .05$. Test–retest reliability was assessed by determining the correlations between scores at baseline and 1 month. Initial validity was assessed through confirmatory factor analysis. Additionally, for the IOCQ–D, validity was examined by testing correlations with 1-month motivational variables and with specified 6-month dietary outcomes and for the IOCQ-S by testing hypothesized relations to 6-month smoking outcomes using regression procedures.

Regression analyses were conducted using "as treated" subsamples of the 1,006 study participants to determine whether the IOCQ predicted change independently from the HCCQ. For the initial validation of the IOCQ–D, only 197 patients who had been randomly assigned to the dietary intervention had data available at 1 month. For validation of the IOCQ–S, 865 participants were active at 1 month; those in the smoking intervention were required to

have completed the intervention (at least four contacts) to be included. If smoking status or information regarding medication use for any of these 865 was not available at the 6-month follow-up, participants were considered to be smoking or as not using medications.

For tests of significance, a .10 cutoff was used rather than the traditional .05 significance level to allow us to report trends in this initial test of the IOCQ–D and IOCQ–S. Accordingly, it should be noted that results reported herein should be replicated in future studies.

RESULTS

Between January 2000 and July 2002 a total of 2,681 smokers called the study site and were screened for eligibility. Of these, 2,037 (76%) were eligible and provided phone consent for having blood for fasting lipid profiles drawn two times, 1 week apart. Of the eligible patients, 1,006 (49%) came to an initial appointment during which they provided full informed consent and completed the baseline questionnaires. As-treated analyses (for smoking) included 865 patients. If they were lost to follow-up or their point prevalence was not confirmed biochemically, they were assumed to be smoking at 6 months. Details of the randomization and full study design are available elsewhere (Williams et al., 2006).

On average, the 1,006 patients were relatively poor and undereducated. Average household income was $34,600 (compared with the average of $44,900 in the county where the trial was conducted), and 11% of the sample older than 24 years of age had graduated from college (compared to 33% in the county). During the 6 months of intervention, 78 patients withdrew from the study, 6 died (no deaths were related to the study), and 79 were lost to follow-up. Sample characteristics are presented in Table 1.

Psychometric Properties of the IOCQ: Internal Consistency

Both versions of the IOCQ (IOCQ–D and IOCQ–S) were tested for internal con-

Table 1
Baseline Characteristics

Characteristics	Community care group (n = 250)	Intensive treatment group (n = 615)	All (n = 865)	p value	Cronbach's α
Sex (% female)	67.5	63.4	64.5	.25	—
Age (years)	44.49	46.13	45.66	.06	—
Socioeconomic status (1–9)	4.34	4.37	4.35	.98	—
Marital status (% married or living as married)	45.80	47.20	46.80	.71	—
Ethnicity (% white)	81.9	83.7	83.0	.53	—
Cigarettes per day	20.75	20.20	20.36	.46	—
Fagerstrom addiction Severity scale	4.93	4.97	4.96	.82	.65
Baseline variables					
Intention to quit in 30 days (%)	44.3	47.6	45.6	.48	—
Autonomous motivation (S)	5.95	6.09	6.05	.12	.87
Perceived competence (S)	4.58	4.65	4.63	.53	.91
Autonomous motivation (D)	5.81	5.82	5.82	.90	.91
Perceived competence (D)	5.60	5.53	5.55	.43	.89

Note. S = Smoking; D = Diet. A factor analysis was conducted on the autonomous motivation and competence motivation items at both baseline and 1 month. In each case, the items loaded cleanly on two factors with eigenvalues exceeding 1.00.

sistency as well as test–retest reliability.[1] For the IOCQ–D, Cronbach's alpha measured at baseline, 1 month, and 6 months was .95 at each assessment; item-to-total correlations at each measurement were acceptable, ranging from .75 to .87, from .75 to .89, and from .76 to .86, respectively. The IOCQ–D thus demonstrated adequate internal consistency at three points in time. The test–retest reliability coefficient from baseline to 1 month was .57.

Cronbach's alpha for the IOCQ–S measured at baseline was .88 for total scores on the 6 items; item-to-total correlations were acceptable, ranging from .59 to .73. Cronbach's alpha at 1 month was .87; item-to-total correlations ranged from .54 to .75. Cronbach's alpha at 6 months was .90; item-to-total correlations ranged from .66 to .80. Thus, the IOCQ–S also demonstrated adequate internal consistency at three points in time. The test-retest reliability coefficient from baseline to 1 month was .53.

Construct Validity of the IOCQ Through Confirmatory Factor Analysis

The adequacy of the factor structure for both versions of the IOCQ was tested by a confirmatory factor analysis with the AMOS program (v.5.0.1), using baseline assessments. It was hypothesized that the IOCQ measured a single factor. The proposed model consisted of one latent construct with each of the 6 items on the respective version of the scale serving as the observed indicators. Parameters were estimated using maximum likelihood. Following convention, we report the chi-square statistic and three other commonly used fit indices: the comparative fit index (CFI), the Tucker–Lewis index (TLI), and the incremental fit index (IFI). For the CFI, TLI, and IFI, values of $\geq .95$ represent good fit (Byrne, 2001).

For the IOCQ–S, the single-factor model showed adequate fit to the data [$\chi^2(5) = 21.14, p < .001$, CFI = .99, TLI = .95, IFI = .99]. For the IOCQ–D, adequate fit for the single-factor model was also supported [$\chi^2(3) = 12.64, p < .01$, CFI = .99, TLI = .95, IFI = .99]. Support was thus found for the single-factor structure of the IOCQ in both its versions. (See Tables 2 and 3.)

Construct Validity Through Relations to Measures and Outcomes

Intercorrelations among the IOCQ–D and IOCQ–S scores assessed at the three points in time are significant and substantial (from .38 to .63), suggesting that the constructs assessed (autonomy support for diet and autonomy support for smoking) are related but distinguishable.

A t test confirmed that patients in the intensive treatment and community care groups did not differ in their experience of autonomy support from their important others regarding either tobacco [$t(859) = -.88, p > .3$ at baseline; $t(482) = .57, p > .5$ at 1 month] or diet [$t(194) = 1.40, p > .1$ at baseline; $t(195) = -1.20, p > .2$ at 1 month]. With one exception (family income), no baseline characteristics were found to significantly explain the diet or cessation outcomes, so they were not included in subsequent hypothesis testing. Total calories at 6 months were found to be significantly correlated with family income ($r = .26, p < .001$). Accordingly, family income was entered as a covariate in analyses testing the impact of autonomy support on this outcome.

Construct validity of the IOCQ–D. The construct validity of the IOCQ–D was explored by testing its relations to motivational and dietary outcomes. Specifically,

[1] Although support related to a behavior change might be expected to change within a 1-month period, we report test–retest correlations in the interest of completeness. Paired-samples t tests revealed that whereas the mean difference between baseline ($M = 4.61, SD = 1.52$) and 1 month ($M = 4.55, SD = 1.73$) for the IOCQ–D was nonsignificant ($p > .3$), the difference between baseline ($M = 4.89, SD = 1.41$) and 1 month ($M = 5.12, SD = 1.45$) on the IOCQ–S was significant [$t(483) = -3.71, p < .001$].

Table 2
Item Means, Standard Deviations, and Item–Total Statistics for the Important Other Climate Questionnaires for Diet at Baseline (N = 840)

Item	*M* ± *SD*	Item–total correlation	Factor loading
1. I feel that my important others have provided me with choices and options about diet in terms of improving cholesterol (including not changing my diet).	4.26 ± 1.84	.75	.74
2. I feel my important others understand how I see things with respect to my diet in terms of improving my cholesterol.	4.47 ± 1.77	.86	.86
3. My important others convey confidence in my ability to make changes regarding my diet in terms of improving cholesterol.	4.56 ± 1.72	.84	.85
4. My important others listen to how I would like to do things regarding my diet in terms of improving cholesterol.	4.56 ± 1.73	.87	.89
5. My important others encourage me to ask questions about my diet in terms of improving cholesterol.	4.32 ± 1.81	.84	.92
6. My important others try to understand how I see my diet in terms of improving cholesterol before suggesting any changes.	4.35 ± 1.74	.87	.95

Note. Factor loadings represent standardized regression weights in a confirmatory factor analysis.

important others' autonomy support for diet and the HCCQ were correlated with autonomy and competence for diet and percentage of calories from fats, percentage of calories from saturated fats, soluble fiber, percentage calories from monounsaturated fats, and total calories. Results are presented in Table 4. Of note, scores on the

Table 3
Item Means, Standard Deviations, and Item–Total Statistics for the Important Other Climate Questionnaires for Smoking at Baseline (N = 856)

Item	*M* ± *SD*	Item–total correlation	Factor loading
1. I feel that my important others have provided me with choices and options about smoking (including quitting or not).	4.84 ± 1.84	.59	.51
2. I feel my important others understand how I see things with respect to my smoking or quitting.	4.84 ± 1.87	.66	.72
3. My important others convey confidence in my ability to make changes regarding my smoking or quitting.	4.82 ± 1.76	.69	.76
4. My important others listen to how I would like to do things regarding my smoking or quitting.	5.03 ± 1.72	.73	.83
5. My important others encourage me to ask questions about my smoking or quitting.	4.53 ± 1.90	.70	.73
6. My important others try to understand how I see my smoking before suggesting any changes.	4.28 ± 1.89	.71	.82

Note. Factor loadings represent standardized regression weights in a confirmatory factor analysis.

IOCQ–D at 1 month correlated significantly with 6-month autonomy for diet (.23, $p < .01$) and competence for diet (.22, $p < .01$) and with 6-month total calories (−.17, $p < .05$), percent calories from fat (−.32, $p < .001$), and percent calories from saturated fat (−.30, $p < .001$). These correlations thus provide initial support for the construct validity of the IOCQ–D.

Multiple regression procedures were used to test the predictive validity of the IOCQ–D. In this test, autonomous motivation at 6 months was regressed onto autonomous motivation at baseline at Step 1 and 1-month scores on the IOCQ–D at Step 2. The result was significant ($F[1, 148] = 3.28$, $p < .08$, $\beta = .12$); important others' autonomy support predicted increases in autonomous motivation for diet from baseline to 6 months. After control for baseline competence, important others autonomy support predicted a significant increase in perceived competence for diet at 6 months ($F[1, 151] = 3.55$, $p < .06$, $\beta = .13$).

These results and those demonstrating the predictive validity of the IOCQ–D with respect to various dietary outcomes are summarized in Table 5. Important others' autonomy support significantly predicted 6-month change in motivation and was significantly correlated with three of the five dietary outcomes.

Construct validity of the IOCQ–S. In separate multiple regressions, autonomous motivation at 6 months and perceived competence at 6 months were regressed onto important others' autonomy support at 1 month, controlling for baseline levels of autonomy and competence for smoking. Important others' autonomy support at 1 month predicted 6-month levels of both autonomous motivation for cessation, $F(1, 377) = 6.31$, $\beta = .10$, $p < .05$, and perceived competence, $F(1, 379) = 7.15$, $\beta = .13$, $p < .01$, as well as autonomous motivation for taking medications, $F(1, 372) = 4.27$, $\beta = .09$, $p < .05$, after controlling for the baseline levels.

Again using multiple regression, others' autonomy support at 1 month was found to predict patients' 6-month self-reported assessment of the longest time they had abstained from smoking cigarettes, controlling for baseline, $F(1, 465) = 9.91$, $\beta = .15$, $p < .01$, and others' autonomy support predicted 6-month self-report of the number of days since their last cigarette, $F(1, 482) = 2.55$, $\beta = .07$, $p > .1$. Others' autonomy support did not account for significant variance in the 6-month assessment of number of days on medications.

To further test the predictive validity of the IOCQ–S, logistic regression was used to predict a number of discrete, 6-month outcomes, including validated 7-day point prevalence cessation, 6-month prolonged abstinence, self-reported medication use, and a serious attempt to quit smoking. The independent predictors were the IOCQ–S at baseline entered at Step 1, to control for patients' initial perception of autonomy support from their important others, followed by the IOCQ–S at 1 month entered at Step 2. For the test of significance, the Wald criterion was used. Results are presented in Table 6. Others' autonomy support significantly predicted medication use and making a serious attempt to quit smoking, and it predicted 7-day point prevalence cessation and 6-month prolonged abstinence. For the subgroup of 466 who indicated that they did not want to stop smoking at baseline, 6-month prolonged abstinence was significantly predicted by others' autonomy support [$z = 3.91$; odds ratio = 1.70; confidence interval = 1.01, 2.88; $p < .05$].

Discriminant validity: Separable contributions of IOCQ–D and HCCQ. Showing that a new scale measures something different from what other available scales measure is an important part of testing the construct validity of the new scale. To test whether the IOCQ adds predictive value beyond that of the HCCQ, a series of regressions was conducted. Autonomous motivation at 6 months was regressed onto

Table 4
Means, Standard Deviations, and Zero-Order Correlations Among Autonomy Support, Motivation, and Dietary Outcomes

	M (*SD*)	2	3	4	5	6	7	8
1. IOCQ–D BL	4.71 (1.40)	.29***	.33***	.40***	−.11	−.08	.04	−.14^{+}
2. HCCQ BL	5.76 (1.15)	1	.27***	.45***	−.10	−.10	−.08	−.09
3. AUT–D BL	5.94 (1.27)		1	.56***	−.22**	−.21**	−.20**	−.14*
4. COMP–D BL	5.56 (1.27)			1	−.18*	−.18*	−.10	−.16*
5. % fat cals BL	32.91 (6.66)				1	.80***	.11	.90***
6. % sfa cals BL	11.05 (3.21)					1	−.02	.60***
7. S-Fiber BL	5.30 (2.25)						1	.16*
8. % MUFA BL	12.50 (2.93)							1
9. TCALS BL	1749.67 (682.43)							
10. IOCQ–D 1 mo	4.75 (1.71)							
11. HCCQ 1 mo	6.29 (0.77)							
12. AUT–D 6 mo	5.80 (1.30)							
13. COMP–D 6 mo	5.37 (1.27)							
14. % fat cals 6 mo	34.07 (7.41)							
15. % sfa cals 6 mo	11.33 (3.14)							
16. S-fiber 6 mo	5.17 (2.38)							
17. % MUFA 6 mo	13.17 (3.49)							
18. TCALS 6 mo	1686.94 (627.41)							

Note. IOCQ–D = Important Others Climate Questionnaire, Diet; HCCQ = Health Care Climate Questionnaire; AUT–D = autonomous motivation for diet; COMP–D = perceived competence for diet; % fat cals = % of calories from fat; % sfa cals = % of calories from saturated fat; S-fiber = soluble dietary fiber; % MUFA = % of calories from monounsaturated fats; TCALS = total calories; BL = baseline.
*$p < .05$. **$p < .01$. ***$p < .001$. †$p < .06$. ††$p < .08$.

the baseline motivation measure at Step 1, onto 1-month scores for both the IOCQ–D and the HCCQ at Step 2, and onto the IOCQ × HCCQ interaction term in Step 3 (predictors were mean-centered). A parallel analysis was conducted for perceived competence for diet at 6 months and for the dietary outcomes that were previously tested. In four of seven cases, IOCQ–D significantly predicted 6-month outcomes, after controlling for HCCQ (Table 7). No significant interactions were found. Thus, the IOCQ–D adds predictive value beyond that of the HCCQ.

9	10	11	12	13	14	15	16	17	18
−.07	.57***	.14†	.19*	.31***	−.26***	−.27***	.06	−.24***	−.08
−.09	.24***	.27***	.32***	.37***	−.16*	−.02	−.00	−.15*	−.01
−.24***	.28***	.28***	.62***	.38***	−.14††	−.16*	−.19**	−.11	−.23**
−.22**	.28***	.24***	.43***	.55***	−.19*	−.14†	−.09	−.17*	−.14†
.33***	−.21**	−.10	−.26***	−.22**	.45***	.43***	.14††	.35***	.24***
.37***	−.21**	−.18*	−.19*	−.14	.39***	.49***	.07	.25***	.24**
.62***	−.03	−.07	−.28***	−.15††	.10	.09	.48***	.09	.46***
.33***	−.21**	−.06	−.22**	−.20*	.40***	.34***	.09	.36***	.22**
1	−.25***	−.19*	−.37***	−.31***	.25***	.32***	.37***	.17*	.71***
	1	.23***	.23**	.22**	−.32***	−.30***	.03	−.30***	−.17*
		1	.30***	.12	−.13††	−.10	−.01	−.10	−.08
			1	.60***	−.25**	−.20*	−.23**	−.23**	−.32***
				1	−.27***	−.23**	−.14	−.24**	−.28***
					1	.77***	−.05	.92***	.27***
						1	−.09	.57***	.32***
							1	−.04	.61***
								1	.20**
									1

Discriminant validity: Separable contributions of IOCQ–S and HCCQ. A similar set of analyses was conducted in which both the IOCQ–S and the HCCQ (centered) were allowed to compete for variance in several smoking outcomes. Results are presented in Table 8. As can be seen, the IOCQ–S predicted three of six and the HCCQ predicted four of six 6-month smoking outcomes. That both IOCQ and HCCQ constructs contribute to 6-month motivation (autonomy and competence) is theoretically important. That both constructs contribute differentially to the diet and smok-

Table 5
Standardized Regression Weights: Impact of 1-Month Important Other Climate Questionnaire for Diet (IOCQ–D) on 6-Month Motivational and Dietary Outcomes After Controlling for Baseline Levels

	6-month outcomes						
	AUT	COMP	% fat	% sfat	S-fiber	% MUFA	TCALS
1. BL	.62***	.55***	.45***	.48***	.48***	.36***	.67***
2. IOCQ–D 1 mo	.12††	.13†	−.23***	−.19**	.05	−.23**	.00

Note. AUT = autonomous motivation for diet; COMP = perceived competence; % fat = % of calories from fat; % sfat = % of calories from saturated fat; S-fiber = soluble dietary fiber; % MUFA = % of calories from monounsaturated fats; TCALS = total calories; BL = baseline level of the respective motivational or dietary outcome. As noted, because total calories at 6 months correlated with family income, income was entered as a covariate in that regression ($\beta = .15$, $p < .01$).
**$p < .01$. ***$p < .001$. †$p < .06$. ††$p < .08$.

ing outcomes provides some support, in the form of discriminant validity, for their being distinct constructs. Notably, there was a significant interaction for autonomous motivation for cessation, such that when autonomy support from health care providers is low, the impact of important others' autonomy support on the outcome of autonomous motivation for cessation is greater.

DISCUSSION

These results demonstrate that autonomy support from important others in the patient's social surround can be reliably measured and that the variation measured on this scale applied in two health domains explains a significant change in patients' perceived autonomy and competence. In addition, the IOCQ also predicted significant variance in change in two important health-related behaviors, namely prolonged tobacco abstinence and dietary change in the context of treatment of elevated cholesterol. Further, the IOCQ was demonstrated to predict separate variance in autonomy, competence, and health-related outcomes from that explained by the autonomy supportiveness of the health care practitioner. Together these findings support the initial validation of use of the IOCQ in health care settings.

These findings provide further evidence that self-determination theory and specifically the construct of autonomy supportiveness, are relevant to health behavior change and its maintenance. In the present study, when IOCQ and HCCQ scores were allowed to compete for variance in several relevant outcomes, both contributed to the smoking outcomes, whereas the IOCQ

Table 6
Logistic Regression of 6-Month Outcomes on Others' Autonomy Support

Variables	Wald (z)	OR	CI	NNT
7-day PP	3.51†	1.38	0.99, 1.93	NA
6-month PA	3.54†	1.40	0.99, 1.97	NA
Taking medications	7.02**	1.35	1.08, 1.70	5.8
Serious QA	12.55***	1.41	1.17, 1.71	8.3

Note. OR = odds ratio; CI = confidence interval; NNT = number needed to treat; PP = validated point prevalence for cessation; NA = not applicable; PA = prolonged abstinence; QA = quit attempt.
*$p < .05$. **$p < .01$. ***$p < .001$. †$p < .07$.

Table 7
Standardized Regression Weights: Impact of 1-Month IOCQ–D versus HCCQ on 6-Month Motivational and Dietary Outcomes

	6-Month Outcomes						
	AUT	COMP	% fat	% sfat	S-fiber	% MUFA	TCALS
1. BL	.63***	.56***	.46***	.51***	.49***	.39***	.66***
2. IOCQ–D 1 mo	.10	.13†	−.25***	−.22***	.05	−.24***	−.02
3. HCCQ 1 mo	.09	−.01	−.04	.03	.03	−.03	.09
4. (2) × (3)	.04	.09	−.04	−.06	.01	−.04	.02

Note. IOCQ–D = Important Others Climate Questionnaire, Diet; HCCQ = Health Care Climate Questionnaire; AUT = autonomous motivation; COMP = perceived competence; % fat = % of calories from fat; % sfat = % of calories from saturated fat; S-fiber = soluble dietary fiber; % MUFA = % of calories from monounsaturated fats; TCALS = total calories; BL = baseline level of the respective motivational or dietary outcome. As noted, because total calories at 6 months correlated with family income, income was entered as a covariate in that regression ($\beta = .15$, $p < 01.$).
**$p < .01$. ***$p < .001$. †$p < .06$.

emerged on average as the more consistent and stronger predictor of the dietary outcomes. This finding is expected because of the greater role that important others take in shaping patient diets by shopping patterns, food preparation, and sharing of meals compared with the role of health care practitioners. Also, the IOCQ and HCCQ were measured at 1 month and much if not all of the dietary change may have been focused on by patients and practitioners later in the trial after they had worked on quitting smoking. Finally, patients were asked to think about interactions with their practitioner in which *either* smoking *or* diet was discussed, yielding a single global score. The IOCQ, however, was administered to patients in two versions, each of which explicitly targeted either smoking or diet behaviors. With this caveat, the finding that the two scales performed differently in this study lends tentative support to the discriminant validity of the IOCQ.

As the change in health behaviors accounted for by the IOCQ appears to be clinically significant, future research is called for to construct and test interventions that

Table 8
Standardized Regression Weights: Impact of 1-Month IOCQ–S Versus HCCQ on 6-Month Motivational and Cessation Outcomes for Smoking

	6-month Outcomes					
	AUT	COMP	A-MEDS	TIMEOFF	DAYS	MEDS
1. BL	.65***	.41***	.49***	.00	NA	NA
2. IOCQ–S 1 mo	.09*	.10*	.06	.14**	.06	.04
3. HCCQ 1 mo	.09*	.13**	.14**	.06	.06	.15***
4. (2) × (3)	−.09*	−.08†	−.04	.02	.02	.02

Note. IOCQ–S = Important Others Climate Questionnaire, Smoking; HCCQ = Health Care Climate Questionnaire; AUT = autonomous motivation for cessation; COMP = perceived competence for cessation; A-MEDS = autonomous motivation for taking medications; TIMEOFF = longest time abstaining from cigarettes; DAYS = number of days since last cigarette; MEDS = taking medication for more days; BL = baseline level of the respective motivational or cessation outcome; NA = not applicable.
*$p < .05$. **$p < .01$. ***$p < .0011$. †$p < .10$.

will increase the autonomy supportiveness of important others. Potential interventions might involve asking important others to come in for treatment sessions with the participants or to come to separate sessions where they are taught about the importance of the targeted health behaviors and the difficulty someone has in making long-term change. Important others may need to learn specific skill sets such as shopping for lower fat foods, estimating calories served, or ways to reduce their own stress so they can be more supportive to others. As suggested by Clark and Dunbar (2003), having important others report their own autonomy supportiveness may facilitate behavior change on their part. Exploring ways to help important others reduce the number of critical statements they make to the person trying to change might be researched. Finally, future researchers might test whether administering separate, domain-specific versions of both the HCCQ and the IOCQ at the most appropriate time related to the intervention would allow the HCCQ to compete successfully for variance with the IOCQ in the realm of diet.

The limitations of this study are that the IOCQ was only tested in smokers with respect to two health behavior domains and that no intervention was tested to determine whether IOCQ scores can be changed. Further, the results cannot be generalized to the larger populations of patients with chronic diseases or for those with mental illness.

In summary, the IOCQ offers a way to reliably measure perceived autonomy support of important others in the setting of health-related behavior change and its maintenance. Although the health behaviors examined were limited to smoking and diet, the IOCQ should be adaptable to other domains as well. Additional research is called for to determine how health care systems and practitioners can work with important others to create change environments that will lead patients to the initiation and maintenance of healthier behaviors.

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