Published in final edited form as:

J Behav Med. 2017 December ; 40(6): 989–997. doi:10.1007/s10865-017-9868-5.

Time to selected quit date and subsequent rates of sustained smoking abstinence

George L. Anesi^{1,2,3}, Scott D. Halpern^{1,2,3,4}, Michael O. Harhay^{2,3,5}, Kevin G. Volpp^{3,4,5,6}, and Kathryn Saulsgiver^{2,3}

¹Division of Pulmonary, Allergy, and Critical Care, Hospital of the University of Pennsylvania, 3600 Spruce Street, Gates Building, Room GA 5044, Philadelphia, PA 19104, USA

²Department of Biostatistics, Epidemiology, and Informatics, Perelman School of Medicine at the University of Pennsylvania, Philadelphia PA, USA

³Leonard Davis Institute of Health Economics, University of Pennsylvania, Philadelphia, PA, USA

⁴Department of Medicine, Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA, USA

⁵Center for Health Equity Research and Promotion, Philadelphia Veterans Affairs Medical Center, Philadelphia, PA, USA

⁶Department of Health Care Management, Wharton School, University of Pennsylvania, Philadelphia, PA, USA

Abstract

In efforts to combat tobacco dependence, most smoking cessation programs offer individuals who smoke the choice of a target quit date. However, it is uncertain whether the time to the selected quit date is associated with participants' chances of achieving sustained abstinence. In a pre-specified secondary analysis of a randomized clinical trial of four financial-incentive programs or usual care to encourage smoking cessation (Halpern et al. in *N Engl J Med* 372(22):2108–2117, doi:10.1056/NEJMoa1414293, 2015), study participants were instructed to select a quit date between 0 and 90 days from enrollment. Among those who selected a quit date and provided complete baseline data ($n = 1848$), we used multivariable logistic regression to evaluate the association of the time to the selected quit date with 6- and 12-month biochemically-confirmed abstinence rates. In the fully adjusted model, the probability of being abstinent at 6 months if the

Correspondence to: George L. Anesi.

Compliance with ethical standards

Conflict of interest George L. Anesi, Scott D. Halpern, Michael O. Harhay, Kevin G. Volpp, and Kathryn Saulsgiver declare that they have no conflicts of interest.

Human and animal right and Informed consent All procedures involving human participants were in accordance with the ethical standards of the Institutional Review Board at the University of Pennsylvania (IRB Protocol #814761) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards, and registered with [Clinicaltrials.gov](https://clinicaltrials.gov) (Protocol #NCT01526265). Informed consent was obtained from all individual participants included in the study.

Electronic supplementary material The online version of this article (doi:10.1007/s10865-017-9868-5) contains supplementary material, which is available to authorized users.

participant selected a quit date in weeks 1, 5, 10, and 13 were 39.6, 22.6, 10.9, and 4.3%, respectively.

Keywords

Tobacco dependence; Smoking cessation; Quit date; Sustained abstinence; Stage-of-change; Readiness-to-quit

Introduction

Tobacco use remains one of the leading preventable causes of morbidity and mortality in the United States (Danaei et al., 2009; Rostron et al., 2014). Numerous tobacco cessation programs and efforts have been studied and deployed, with varying levels of success, utilizing pharmacotherapy, counseling, technology aids, financial and other incentives, media, and legislation, among other approaches and combinations thereof (Zhu et al., 2012). While progress has been made, smoking rates remain suboptimal (Jamal et al., 2016) and emerging threats exist including from the dramatic rise in electronic cigarette use among youth and young adults, as detailed in a new Surgeon General's Report (U.S. Department of Health and Human Services, 2016). Continued research into developing effective tools for sustained smoking cessation is clearly warranted.

Past studies of the epidemiology of individuals who smoke and of tobacco cessation programs have revealed much about predictors of successful quit attempts. A systematic review (Vangeli et al., 2011) identified current tobacco dependence severity as a strong predictor of quit attempt success, while pooled analyses showed no associations between quit attempt success and gender, marital status, education level, opinion of smoking, worries about tobacco's adverse health effects, and enjoyment of smoking, and mixed results for age, socioeconomic status, prior quit attempts, duration of past abstinence periods, desire to quit, and confidence in quitting.

Tobacco cessation efforts at the level of the individual routinely offer individuals who smoke the choice of a target quit date (Alessi & Petry, 2014). It is unknown whether this choice—more specifically, the time from commencing a cessation effort to the selected quit date—is associated with the chances of successful sustained abstinence. The literature suggests that unplanned quit attempts in which individuals quit abruptly after making the decision to do so may be more successful than planned attempts in which individuals work their way towards a more distant selected quit date (Larabie, 2005; West & Sohal, 2006; Lindson-Hawley et al., 2016). There are several potential explanations for such a phenomenon. First, the time to selected quit date may simply represent a proxy for readiness-to-quit. Second, it is possible that specific concerns about quitting, such as weight gain (Pankova et al., 2016), increase over time. Third, it is possible that motivation or momentum to quit wane over time, or that some similarly causal mechanism exists whereby waiting longer until a selected quit date actually reduces the odds of success.

Using detailed data collected as part of a recent randomized clinical trial of financial incentive programs to encourage smoking cessation (Halpern et al., 2015), we sought to

determine whether the time to a specific quit date is independently associated with the likelihood of sustained abstinence. We also compared the predictive power of the timing of selected quit dates to that of established predictors of sustained abstinence.

Methods

We conducted a pre-specified secondary analysis, using data originally collected as part of a randomized clinical trial of four financial-incentive programs or usual care to encourage smoking cessation (Halpern et al., 2015; French et al., 2015; Halpern et al., 2016), in order to measure the association of the time to selected quit date with the rate of successful sustained abstinence. All analyses were performed using Stata version 14.2 (StataCorp LP, College Station, TX, USA). The study protocol and informed consent process were approved by the Institutional Review Board at the University of Pennsylvania (Philadelphia, PA, USA).

Original trial data

A full description of the original study design has been reported previously (Halpern et al., 2015). In brief, eligible study participants were CVS Caremark employees or their family members or friends who smoked in the United States. Inclusion criteria included age at least 18 years, self-report of smoking at least 5 cigarettes per day, access to an internet-connected computer, and an indicated interested in stopping smoking. Enrollment occurred from February 2012 to October 2012 through a multifaceted recruitment scheme. Participants completed a comprehensive intake survey of self-reported baseline characteristics including demographics, smoking history, social pressures, delay discounting [a measure of impulsivity that reflects people's tendencies to discount the value of a reward as a function of how far in the future it would be received (Kirby, 1997)], and financial characteristics, and then were randomized to one of four financial-incentive programs or usual care. The study deployed an adaptive randomization algorithm (French et al., 2015; Brown et al., 2009; Dragalin, 2006; Hu et al., 2009) that was also stratified by annual household income (less than or at least \$60,000, the CVS Caremark workforce median) and whether the participants had full health benefits through CVS Caremark.

All participants received usual care, which consisted of provision of information about local smoking cessation resources and smoking cessation guides from the American Cancer Society; free access to nicotine-replacement therapy and behavioral counseling was available for those employees receiving CVS Caremark benefits. Participants in the intervention arms were offered one of four financial incentives with expected values of \$800 including: an individual reward program in which participants could earn up to \$800 for smoking cessation; an individual deposit program in which a required \$150 deposit could be refunded in addition to a maximum \$650 reward for smoking cessation; a collaborative reward program in which participants' earnings increased based on the successful smoking cessation of other participants in six-person groups; and a competitive deposit program in which participants' earnings increased based on the unsuccessful smoking cessation of other participants in six-person groups. As we have reported previously, median payouts in these four groups were similar (Halpern et al., 2015). Participants assigned to the intervention

arms had the ability to accept or decline the assigned intervention; participants who rejected their randomized assignment were then assigned to a second usual care arm.

Following completion of the intake survey, arm assignment, and intervention acceptance or rejection, participants were instructed to select a personal target quit date from 0 to 90 days from study enrollment. 1 month after randomization, participants who had not yet specified a quit date were assigned a quit date of 90 days from enrollment; these participants were excluded from present analyses because we were interested in quit dates chosen by the individuals themselves.

Sustained abstinence was assessed biochemically using submitted saliva samples [success was considered a salivary cotinine concentration of <10 ng per ml (Society for Research on Nicotine and Tobacco Subcommittee on Biochemical Verification, 2002)], or for participants using nicotine-replacement therapy, urine samples [success was considered a urinary anabasine concentration of <3 ng per ml (Jacob et al., 2002)]. Saliva samples were tested using NicAlert strip tests by study staff at the University of Pennsylvania (Philadelphia, PA, USA) and urine samples were tested at ARUP Laboratories (Salt Lake City, UT, USA). Participants who failed to submit samples were considered to be actively smoking.

Study design

For this pre-specified secondary analysis, we conducted a cohort study among participants who selected a target quit date by 1 month after randomization and provided complete baseline data on the covariates of interest. The primary exposure was the time to selected quit date. The primary outcome was whether or not participants achieved sustained biochemical abstinence from smoking at 6 months (Hughes et al., 2003). The secondary outcome was sustained biochemical abstinence from smoking at 12 months. Based on an examination of its distribution, the self-selected quit date exposure was treated as a categorical variable by week (see Results below).

Statistical analysis and adjustment variables

Multivariable logistic regression was used to evaluate the primary and secondary outcomes. All models were adjusted for the characteristics used to stratify randomization (household income and CVS insurance status) and arm assignment (for an intention-to-treat approach). The base model was then adjusted iteratively for groups of baseline covariates (Supplemental Table S1) including demographics, smoking history, social pressures, delay discounting, and financial characteristics. The fully adjusted model included all covariates.

Due to the large number of participants who selected a quit date of 90 days from enrollment (the maximum allowable time to a selected quit date) and a concern that this population might be fundamentally different, we additionally compared this cohort's sustained abstinence outcomes with those of the rest of the study population.

Assessment of predictive validity

As part of the baseline survey, participants' stage-of-change (Prochaska & Velicer, 1997) was assessed by the question "are you seriously thinking of quitting smoking?" Participants

answering “yes, within the next 30 days” were considered to be in the preparation stage and participants answering “yes, within the next 6 months” were considered to be in the contemplation stage. The predictive validity for sustained abstinence at 6 months of stage-of-change (as a binary variable: preparation vs. contemplation) compared to time to selected quit date (as a categorical variable by week) was assessed by the area under the receiver operating characteristic curve (AUROC). AUROCs were judged to be poor (0.6–0.7), adequate (0.7–0.8), good (0.8–0.9), or excellent (>0.9) (Hanley & McNeil, 1982). Calibration was assessed by Hosmer–Lemeshow goodness-of-fit tests.

Assessment of selected quit date as a marker of stage-of-change

A competing hypothesis is that time to selected quit date is simply a new marker of stage-of-change rather than in the causal pathway between stage-of-change and sustained smoking abstinence. To investigate this theory we analyzed the association between time to selected quit week and stage-of-change and between time to selected quit week and other markers of nicotine dependence assessed at baseline including: Fagerström score, number of years smoked, current or past use of smoking cessation pharmacotherapy, tobacco exposure at home or at work, history of a 24-h quit attempt in the past year, use of other tobacco products, and likelihood of quitting or cutting back with a \$1-per-pack price increase. To quantify these potential associations, we examined the correlation between time to selected quit week and continuous variables using correlation coefficients, and for binary variables we estimated AUROC using the predicted probabilities from a model that only included time to selected quit week to predict stage-of-change.

Results

Distribution of time to selected quit dates

Of 2538 participants enrolled in the study, 2028 (79.9%) participants self-selected a target quit date from 0 to 90 days from enrollment. The 510 (20.1%) participants who failed to select a quit date by 1 month after randomization were assigned a quit date of 90 days from enrollment, and were excluded from this analysis. Among the primary study population—those who made a selection and provided complete baseline data ($n = 1848$)—the distribution of time to selected quit date was highly left-skewed due to 654 (35.4%) participants selecting a quit date of 90 days from enrollment. Participants who selected a quit date in weeks 1–12 (days 0–84) were generally evenly distributed by week ranging 59–128 (3.2–6.9%) participants per week, in contrast to the 704 (38.1%) total participants who selected a quit date in week 13 (days 85–90) (Fig. 1). The distribution remained similar when including participants who selected a quit date but did not provide complete baseline data ($n = 2028$). As a result, time to selected quit date was treated as a categorical variable by week in subsequent analyses.

Characteristics of study participants by time to selected quit date

Table 1 reports baseline participant characteristics including demographics, smoking history, social pressures, delay discounting, and financial characteristics, for the complete primary study population (those who selected a quit date and provided complete baseline data; $n = 1848$) and by representative selected quit weeks (1, 5, 10, and 13). Participants who selected

quit dates further from study initiation tended to be characterized by: less education; less frequently white race; worse self-reported health status; more cigarettes smoked per day; more likely contemplation stage [i.e., seriously thinking of quitting smoking in the next 6 months, rather than the next 30 days (preparation stage)]; higher degree of nicotine dependence; lower household income; less likely to have access to a bank account, credit card, or debit card; higher rate of failing to pay monthly bills; increasing debt; and greater delay discounting.

Time to selected quit date and sustained abstinence

In the base model adjusted for only the characteristics used to stratify randomization (household income and CVS insurance status) and arm assignment (for an intention-to-treat approach), the probability of being abstinent at 6 months (the primary outcome) if the participant selected a quit date in weeks 1, 5, 10, and 13 were 43.0, 21.6, 10.1, and 4.2%, respectively. In iterative adjustments for groups of covariates reflecting participant demographics, smoking history, social pressures, delay discounting, and financial characteristics, these associations remained consistent. In the fully adjusted model including all covariates, the probability of being abstinent at 6 months if the participant selected a quit date in weeks 1, 5, 10, and 13 were 39.6, 22.6, 10.9, and 4.3%, respectively (Fig. 2).

Similar associations were observed for the base model, iteratively adjusted models, and fully adjusted model for the secondary outcome of sustained abstinence at 12 months. In the fully adjusted model, the probability of being abstinent at 12 months if the participant selected a quit date in weeks 1, 5, 10, and 13 were 19.7, 12.6, 9.0, and 1.9%, respectively (Fig. 2).

In fully adjusted models including all covariates, participants who selected a quit date in week 13 (92.9% of whom selected the maximum of day 90) had an 80.8% reduced odds of being abstinent at 6 months (OR = 0.191, 95% CI 0.168–0.214, $p < 0.0001$) and an 81.9% reduced odds of being abstinent at 12 months (OR = 0.181, 95% CI 0.097, $p < 0.001$), compared to participants who selected a quit date in weeks 1–12. These relationships remained similar if only participants who selected a quit date of exactly 90 days from study initiation were compared to those who selected a quit date of <90 days: an 83.8% reduced odds of being abstinent at 6 months (OR = 0.162, 95% CI 0.100–0.262, $p < 0.0001$) and an 82.9% reduced odds of being abstinent at 12 months (OR = 0.171, 95% CI 0.089–0.330, $p < 0.001$).

Predicting sustained abstinence

In the baseline survey 11 (0.6%) participants answered “no” to the stage-of-change question “are you seriously thinking of quitting smoking?”, which would correspond to the pre-contemplation stage. However, because participants were initially recruited after having indicated an interest in stopping smoking, we grouped these participants with those in the contemplation stage.

The predictive validity for 6-month abstinence for time to selected quit date (as a categorical variable by week) was found to be good (AUROC = 0.81, 95% CI 0.78–0.84) while the predictive validity of stage-of-change (as a binary variable: preparation vs. contemplation) was found to be poor (AUROC = 0.66, 95% CI 0.62–0.69) (Fig. 3). The differences in the

AUROC were statistically significant ($p < 0.0001$), suggesting good discrimination, and Hosmer-Lemeshow goodness-of-fit tests (using 10 groups) suggested good calibration for both time to selected quit data ($p=0.989$) and stage-of-change ($p=0.710$).

Time to selected quit date and stage-of-change

Time to selected quit week was highly associated with stage-of-change (AUROC = 0.76). Among the other baseline markers of nicotine dependence, selected quit week was only associated with current use of smoking cessation pharmacotherapy (AUROC = 0.61) while it was poorly associated with Fagerström score (correlation coefficient = 0.12), number of years smoked (correlation coefficient = 0.01), past use of smoking cessation pharmacotherapy (AUROC = 0.57), tobacco exposure at home (AUROC = 0.54) or at work (AUROC = 0.54), history of a 24-h quit attempt in the past year (AUROC = 0.57), use of other tobacco products (AUROC = 0.56), and likelihood of quitting (correlation coefficient = -0.07) or cutting back (correlation coefficient = -0.01) with a \$1-per-pack price increase.

Discussion

This study yields two important findings. First, it demonstrates a strong association between time to selected quit date (by week) from study enrollment and the probability of sustained abstinence from smoking at 6 and 12 months. Second, it shows that time to selected quit date is a better predictor of future successful abstinence than the often-used stage-of-change measure of self-reported readiness-to-quit (i.e., preparation stage/planning to quit within 30 days, contemplation stage/planning to quit within 6 months, etc.).

It is uncertain whether the finding of a strong association between time to selected quit date and sustained abstinence rate is causal in nature. The act of selecting a target quit date more or less far off in the future could materially change the odds of achieving abstinence, or the choice could merely represent a marker of an individual's underlying motivation and readiness-to-quit and likelihood of successful abstinence. The later association has face validity: individuals less interested in quitting are likely to select a more distant target quit date. A casual relationship is plausible based on behavioral economic principles in that individuals may have greater success in achieving (and therefore sustaining) abstinence if they avoid procrastination and do this near the onset of a smoking cessation program in which they will have maximal support rather than towards the end of the program (Westman et al., 1997). The observation that time to selected quit date is strongly associated with stage-of-change raises the possibility that selected quit date may be a marker of readiness-to-quit. However, the partial or absent associations with markers of nicotine dependence suggest that time to selected quit date may be in the causal pathway leading to sustained smoking abstinence. Future work is necessary to tease apart these possibilities.

The finding that time to selected quit date is a better predictor of future successful abstinence than the frequently used stage-of-change is important. In contexts in which quit date selections are available, investigators may find that adjusting for this variable provides greater control of confounding than would be achieved by adjusting for stage-of-change.

Future studies are needed to establish a causal relationship between time to self-selected quit date and sustained abstinence, and subsequently to test whether such a causal effect is modifiable. This could be done first through observational meta-analyses taking advantage of a natural experiment in which we compare sustained abstinence outcomes of otherwise similar participants of different smoking cessation studies who were restricted to different target quit date windows. Next, prospective experimental studies could either randomize participants to target quit dates or require or nudge towards selection of earlier target quit dates than those originally self-selected by participants. Aside from those comparing strategies of quitting abruptly versus gradually, and therefore with a more distant target quit date (Lindson-Hawley et al., 2016), we are not aware of such studies yet in the literature.

Establishing an improved predictor of future successful abstinence is certainly useful, but discovering a modifiable causal exposure would have the potential for great clinical impact.

Strengths and limitations

This study benefits from a rich dataset originally collected during a prospective clinical trial including detailed baseline characteristics and validated biochemically assessed abstinence rates. This study also has a number of important limitations. First, this study is a secondary analysis, albeit pre-specified. Second, as with any clinical trial, inclusion and exclusion criteria can limit generalizability. The original trial was limited to an adult population who expressed a clear desire to quit smoking, who were either gainfully employed or were a family member or friend of someone who was, and who had access to an internet-connected computer; this secondary analysis further focuses on participants willing to select a target quit date. Our findings may therefore be less generalizable to other populations including teenagers who smoke, those more economically unstable, and those less motivated to quit smoking (i.e., pre-contemplative). Third, due to the original trial design, participants chose a target quit date after being randomized. While we adjust for intention-to-treat arm assignment, this is inferior to selecting a quit date either blinded to the smoking cessation program details or with all participants experiencing the same smoking cessation program, and is a consequence of approaching this via a secondary analysis. Finally, this is a study of association, and, as discussed above, it is not yet known whether the observed correlation between time to selected quit date and sustained abstinence rates is in any way causal.

Conclusions

Among individuals who smoke who are given opportunities to choose future quit dates following enrollment in a trial of smoking cessation, selected dates farther in the future are associated with reduced odds of achieving sustained abstinence. Future studies should test whether guiding patients to choose an earlier quit date can improve sustained abstinence rates.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Funding This work was funded by the U.S. National Institutes of Health (T32HL098054 to GLA; R01CA159932 to SDH, MOH, and KGV; and F31HL127947 to MOH). CVS Caremark provided in-kind support only (CVS employees directly assisted with recruitment of study participants in the original trial).

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Fig. 1.
Enrollment, eligibility, and selected quit dates

Fig. 2.
Adjusted sustained abstinence rates by selected quit week

Fig. 3.
Time to selected quit date and stage-of-change as predictors of 6-month abstinence

Table 1

Baseline participant characteristics

Baseline characteristic	All participants N = 1848	Representative selected quit week			
		Week 1 N = 126	Week 5 N = 111	Week 10 N = 98	Week 13 N = 704
Demographics					
Age—years, median (IQR)	33 (25.5–46)	33 (26–46)	35 (26.5–48)	31 (25.25–47)	33 (26–46)
Female, N (%)	1164 (63%)	70 (56%)	79 (71%)	62 (63%)	461 (65%)
White race, N (%)	1539 (83%)	108 (86%)	95 (86%)	86 (88%)	543 (77%)
Hispanic ethnicity, N (%)	115 (6%)	10 (8%)	5 (5%)	8 (8%)	36 (5%)
Years of education, median (IQR)	13 (12–15)	14 (13–16)	13 (12–14.5)	13 (12–14)	13 (12–14)
Married or living with partner, N (%)	829 (45%)	65 (52%)	47 (42%)	47 (48%)	289 (41%)
Number in household, median (IQR)	3 (2–4)	3 (2–4)	3 (2–4)	3 (2–4)	3 (2–4)
Self-reported health status—excellent or very good, N (%)	660 (36%)	47 (37%)	46 (41%)	32 (33%)	219 (31%)
Household Income—less than \$60,000, N (%)	1363 (74%)	83 (66%)	75 (68%)	65 (66%)	560 (80%)
Enrolled in the CVS Caremark medical plan, N (%)	743 (40%)	50 (40%)	41 (37%)	37 (38%)	284 (40%)
Smoking history					
Number of cigarettes smoked per day, median (IQR)	15 (10–20)	12 (8–16.75)	15 (10–20)	17 (10–20)	15 (10–20)
Money spent per week on cigarettes—\$, median (IQR)	35 (25–50)	30 (20–45)	30 (24.5–46.5)	38 (30–50)	35 (25–50)
Number of years smoked, median (IQR)	14 (6–25)	13 (6–24.25)	15 (7.5–25)	11.5 (7–26)	14.5 (7–27)
Age first smoked, median (IQR)	17 (15–19)	17 (15–19)	17 (15–20)	17 (15–18)	17 (15–19)
Exposed to smoke at home, N (%)	916 (50%)	57 (45%)	55 (50%)	50 (51%)	349 (50%)
Exposed to smoke at work, N (%)	510 (28%)	32 (25%)	24 (22%)	28 (29%)	203 (29%)
Do not use other tobacco products, N (%)	1642 (89%)	114 (90%)	101 (91%)	91 (93%)	617 (88%)
Currently using any cessation aids to help quit, N (%)	228 (12%)	32 (25%)	11 (10%)	7 (7%)	72 (10%)
Ever used any cessation aids to help quit, N (%)	996 (54%)	67 (53%)	55 (50%)	49 (50%)	421 (60%)
Have you made a 24-h quit attempt in the past year?—yes, N (%)	1157 (63%)	81 (64%)	78 (70%)	59 (60%)	398 (57%)
Seriously thinking of quitting smoking, N (%)					
Yes, within the next 30 days	1199 (65%)	119 (94%)	97 (87%)	78 (80%)	269 (38%)
Yes, within the next 6 months	649 (35%)	7 (6%)	14 (13%)	20 (20%)	435 (62%)
Fagerstrom Scale, median (IQR)	5 (3–6)	4 (2.25–5)	5 (3–6)	5 (3–6)	5 (3–6)
Likely/very likely to quit due to \$/pack price increase, N (%)	1266 (69%)	86 (68%)	80 (72%)	73 (74%)	462 (66%)

Baseline characteristic	All participants N = 1848	Representative selected quit week			
		Week 1 N = 126	Week 5 N = 111	Week 10 N = 98	Week 13 N = 704
Likely/very likely to cut down due to \$/pack price increase, N (%)	1387 (75%)	87 (69%)	88 (79%)	72 (73%)	527 (75%)
Financial and social pressures					
Current access to financial instruments, N (%)					
Bank account	1533 (83%)	107 (85%)	100 (90%)	87 (89%)	541 (77%)
Credit card	868 (47%)	71 (56%)	62 (56%)	51 (52%)	265 (38%)
Debit card	1496 (81%)	111 (88%)	93 (84%)	80 (82%)	531 (75%)
None of the above	166 (9%)	5 (4%)	6 (5%)	8 (8%)	92 (13%)
Over the past year, failed to pay any of your monthly bills in full for 2 + months, N (%)	724 (39%)	52 (41%)	50 (45%)	38 (39%)	278 (39%)
Over the coming year, expect to fail to pay any of your monthly bills for 2 + months, N (%)	545 (29%)	42 (33%)	40 (36%)	28 (29%)	213 (30%)
Over the past year, change in amount of loans and credit card debt, N (%)					
Increase	499 (27%)	28 (22%)	23 (21%)	24 (24%)	188 (27%)
Decrease	371 (20%)	36 (29%)	24 (22%)	21 (21%)	114 (16%)
Stay the same	747 (40%)	48 (38%)	52 (47%)	42 (43%)	304 (43%)
Expect spare money this week—scale 1–11, median (IQR)	3 (1–5)	3 (1–5.75)	2 (1–3.5)	3 (1–5)	3 (1–5)
Expect spare money 6 months from now—scale 1–11, median (IQR)	4 (2–6)	5 (3–6)	4 (2–6)	4.5 (2.25–6)	4 (2–6)
Expect spare time this week—scale 1–11, median (IQR)	4 (3–6)	5 (3–6.75)	4 (3–6)	4 (2–6)	4 (2–6)
Expect spare time 6 months from now—scale 1–11, median (IQR)	5 (3–6)	5 (4–7)	5 (3–6)	5 (3–6.75)	5 (3–7)
Current stress level at work—scale 1–10, median (IQR)	6 (4–8)	6 (5–8)	6 (4–8)	6 (4–7)	6 (4–8)
Current stress level at home—scale 1–10, median (IQR)	5 (3–7)	5 (3–7)	5 (3–7)	5 (3–6.75)	5 (3–8)
Delay discounting					
Delay discounting parameter—k-value, median (IQR) Substitute/complimentary reinforcers, median (IQR)	0.041 (0.006–0.1)	0.016 (0.008–0.041)	0.016 (0.006–0.041)	0.016 (0.006–0.085)	0.041 (0.016–0.1)
Substitute /complimentary reinforcers, median (IQR)					
Substitute reinforcer count	13 (9–16)	14 (11–17)	13 (9–16)	13.5 (9–16)	12 (9–16)
Substitute reinforcer value	77.5 (54–101)	80 (61–106)	77 (51.5–97.5)	73 (54.5–99.25)	74 (49.75–98)
Complimentary reinforcer count	7 (4–10)	6 (4–10)	6 (4–10)	6.5 (5–9)	7 (5–10)
Complimentary reinforcer value	44 (27–64)	40.5 (25–61.75)	42 (24.5–61.5)	42.5 (30–58.75)	47 (29.75–66)