5-11-2023

WHEN TO SET GOALS THAT HOLD? LONGITUDINAL EVIDENCE FROM INFORMATION SYSTEM-SUPPORTED SMOKING CESSATION

Tong Li
University of Hamburg, tong.li@uni-hamburg.de

Samuli Laato
Tampere University, samuli.laato@tuni.fi

Yang Yang
University of Warwick, yang.yang@wbs.ac.uk

WHEN TO SET GOALS THAT HOLD? LONGITUDINAL EVIDENCE FROM INFORMATION SYSTEM-SUPPORTED SMOKING CESSATION

Research Paper

Tong Li, The University of Hamburg, Germany, tong.li@uni-hamburg.de
Samuli Laato, Tampere University, Finland, samuli.laato@utu.fi
Yang Yang, The University of Warwick, UK, yang.yang@wbs.ac.uk

Abstract

Goal setting literature suggests that individuals set their goals more frequently on temporal landmarks, e.g. the New Year's Day (known as the fresh start effect). What remains unclear is whether setting goals on temporal landmarks has also a positive impact on goal attainment. We investigated goal setting and attainment behaviours in the context of an information system dedicated to smoking cessation with design features to promote such behaviours. We collected data from almost 1 million unique participants from 2015 to 2021 and studied the effects of goals set on temporal landmarks on goal attainment for two groups: (1) participants in their first attempts; and (2) participants who continuously set the same goal. The results show that setting goals on temporal landmarks has mostly a negative influence on goal attainment for the first group. However, for the second group, setting goals on temporal landmarks is largely positively correlated with goal attainment.

Keywords: Goal Setting, Goal Attainment, Aspirational Behaviour, Smoking Cessation

1 Introduction

There are 1.3 billion tobacco users in the world (World Health Organization, 2022) and 780 million smokers worldwide who claim that they want to quit smoking (World Health Organization, 2020). Prior research suggests that smokers need multi-faceted motivation and support to quit smoking and that there is no silver bullet solution to the problem (Buczkowski et al., 2014, Smit et al., 2014, Baha and Le Faou, 2010, Siru et al., 2009, Williams et al., 2002). The literature on temporal landmarks suggests that smokers are motivated to set the goal to quit smoking on meaningful days (Dai et al., 2015, Dai et al., 2014). Temporal landmarks are formally defined as special dates that "…stand in marked contrast to the seemingly unending stream of trivial and ordinary occurrences" (Shum, 1998, p, 423), offering a *"fresh start effect"*. Temporal landmarks offer individuals a new mental accounting period that reflects upon and re-directs one's behaviour onto a new course (Dai et al., 2014) as well as supports people's conviction to pursue behaviour change goals (Dai et al., 2014, Davydenko and Peetz, 2019). As such, temporal landmarks spur self-improvement (Peetz and Wilson, 2013) and goal initiation (Dai et al., 2015, Hennecke and Converse, 2017, Davydenko and Peetz, 2019), in contexts such as COVID-19 vaccinations (Dai et al., 2021), retirement savings (Beshears et al., 2021), and health-related activities (Dai et al., 2014).

While past research has demonstrated in multiple empirical settings that temporal landmarks boost immediate behaviour, such as goal setting (Dai et al., 2014, Beshears et al., 2021, Cherchye et al., 2020), the longitudinal impact of temporal landmarks on goalkeeping still requires further study. Specifically, we do not know if setting goals on these temporal landmarks positively also influences goalkeeping behaviour. In the context of smoking cessation, it is, therefore, left unanswered whether setting the goal of quitting smoking on temporal landmarks also increases the performance of smoking cessation. Given the context of goal attainment, and the paramount impacts that smoking has on population-level health

(World Health Organization, 2022), it is critical to understand the long-lasting impact of temporal landmarks on behavioural persistence in goal attainment.

Goal setting theory suggests that two main factors predict goal attainment: the goals being (1) challenging; and (2) quantifiable (precise) (Locke and Latham, 2006). However, there is a lack of studies on the impact of temporary landmarks on quantifiable goals, such as deadlines. For example, many do not study goals with clear deadlines (e.g. Koo et al., 2020, Dai et al., 2014). According to goal setting theory (Locke and Latham, 2006), what is needed is to standardise the goals with clear deadlines for individuals when they start their goals and make them aware that other people have the same quantifiable goals. Making goals quantifiable also makes the impact of temporary landmarks on goal attainment meaningfully quantifiable. Another literature gap is that prior studies tend to consider all the subjects as one group to study the effect of temporal landmarks (e.g. Beshears et al., 2021, Dai et al., 2014, Davydenko and Peetz, 2019). However, individuals may have different goal setting behaviours, e.g., initial goal setting and continuous goal setting. In reality, individuals attempt multiple times to achieve their goals before a number of failures. For instance, many smokers may attempt 30 or more times to quit smoking before they are physically free from smoking (Chaiton et al., 2016). It is unclear if the impact of temporary landmarks on the initial goal and continuous goal behaviours works the same or in a similar fashion. Therefore, it is important that scholars consider individuals with different goal-setting behaviours, i.e., first-time goal setting and continuous goal setting.

Today, there are various behaviour change support systems (Oinas-Kukkonen, 2013), motivational information systems (Koivisto and Hamari, 2019), and other digital tools aimed at helping users reach desired behaviour goals (Kim et al., 2020, Locke and Latham, 2006, Choi et al., 2007). These systems utilise a wide range of theoretically derived solutions to boost goal setting and attainment. This gives the opportunity for IS scholars to contribute research to address issues that affect population-level health. Thus, to address these literature gaps, we collected longitudinal data of 956,883 unique individuals engaging in IS-supported smoking cessation groups. This context offers group participants the same goal and deadline: smoking cessation for 135 continuous days. We further divided the group participants into two groups: (1) those joining a group for the first time; and (2) those who joined multiple groups over time. We examined the effects of setting goals on temporal landmarks on goal attainment. We found that the first group's goal attainment is mostly negatively influenced by temporal landmarks, and the second group's goal attainment is largely positively influenced by these landmarks.

With this research approach, we contribute empirical evidence on the impact of temporal landmarks on goal setting and attainment, using data from a real-life context of IS-supported smoking cessation. With the research setting, where the same goals are given with clear deadlines, and individuals are categorised into initial and continuous attempt groups, we demonstrate that the fresh start effect is not straightforward. Our results suggest that initial goal setting on temporal landmarks is, to some degree, driven by impulsive behaviour, a form of behaviour associated with deficient self-regulation. Continuous goal setting, on the other hand, can be seen to relate to motivation and dedication. We notice a statistically significant positive correlation between goal setting on temporal landmarks and goal attainment for "multi-time joiners", supporting the literature on temporal landmarks with empirical evidence from a real-world use case.

This study also contributes a "do-able" strategy to a real-world challenge of smoking cessation that can be of use for both individuals striving for behaviour change, as well as organisations, such as WHO, who promote and organise population-level health interventions. Our study offers valuable practice-derived insights on the role of temporal landmarks in smoking cessation, which can be adopted to improve people's health in this domain (Perkins and Scott, 2008, Smith et al., 2016, Van Den Putte et al., 2005, Struik and Baskerville, 2014, Siru et al., 2009). This paper proceeds as follows. We present our theoretical background and hypotheses. Then, we detail the materials and methods for our empirical work followed by the results. We discuss the key implications of this research and its limitations and propose future research directions.

2 Theoretical background

2.1 Goal Setting Theory

Goal setting theory is a key pillar of behaviour change research, and the result of inductive reasoning based on hundreds of laboratory and field experiments (Locke and Latham, 2006). The theory has three key components: (1) goal attainability; (2) goal difficulty; and (3) goal specificity. Within these dimensions, Locke and Latham (2006) demonstrate that for better goal attainment, individuals need to set (1) specific rather than vague; and (2) high and hard rather than easy goals (Locke and Latham, 2006). These findings have been reaffirmed over the years in multiple studies, making goal setting theory one of the best-tested and most reliable conceptualisations for understanding goal setting and attainment (Locke et al., 1981). However, recent work (e.g. McEwan et al., 2016, Swann et al., 2021) has challenged the generalisability of the theory, arguing that the central tenets (specific and difficult goals are the best) do not apply similarly in all forms of goals. For example, within the domain of physical activity performance, goals work well for already active individuals, but an alternative, learning goals, maybe a more prudent pursuit for physically inactive individuals (Swann et al., 2021).

For individuals striving for better goal attainment, the goal setting literature suggests setting specific, measurable, achievable, relevant, and time-bound (SMART) goals (Doran, 1981). And such goals can have multiple positive effects, for example, in the workplace environment (Weintraub et al., 2021). As discussed, there are various motivational information systems (Koivisto and Hamari, 2019) and behaviour change support systems (Oinas-Kukkonen, 2013), which are designed with the central principles of goal setting theory in mind. A popular operationalisation of the theory is that users are given specific goals that may be difficult, but not unreachable (Swann et al., 2021). Examples include the World Health Organization (WHO) goal of walking 10 000 steps a day (Choi et al., 2007) which is implemented in health games such as Pikmin Bloom, and online smoking cessation applications, that challenge users to report their abstinence behaviour daily. In summary, the theory predicts that having these concrete and specific goals supports users' goal attainment (Locke and Latham, 2006).

Building on goal setting theory, previous research has explored the relationships between goals and changes in addictive behaviour in multiple different contexts (Strecher et al., 1995, Ussher et al., 2003, Borrelli and Mermelstein, 1994, Webb et al., 2010, Lozano et al., 2006, Park et al., 2017). For example, in the context of smoking cigarettes, smokers who imagine life events after smoking cessation are more likely to quit smoking (Chiou and Wu, 2017). And, setting a high-quality well-defined goal is associated with an increase in goal attainment in smoking cessation (Lorencatto et al., 2016), as predicted by goal setting theory. Overall, smokers are subject to psychological mechanisms to initiate and maintain their smoking-cessation related goals (Mann et al., 2013). Thus, interventions focusing on singular aspects are typically insufficient because various factors need to be considered to increase goal attainment (King, 1997). In order to better understand individuals' goal setting, we next review the literature on initial and continuous goal setting.

2.2 Initial and Continuous Goal Setting

A distinction in goal setting theory can be made between initial and continuous goals. We understand initial goal action as the general level of commitment to a goal (Fishbach and Dhar, 2005). The previous literature largely treats initial goal setting as an antecedent for subsequent behaviour or change (e.g. Butler, 2006, Cron et al., 2005, Fishbach and Dhar, 2005, Williams et al., 2000). This literature suggests that initial goal setting serves as a starting reference point for subsequent goal setting. However, in practice, individuals do not know whether their initial goal setting would result in actual subsequent goal setting in a completely voluntary context, since individuals cannot foresee their actual goal attainment in their initial goal setting and subsequent goal-setting behaviour. Therefore, the impact of some external factors (e.g. temporal landmarks which we focus on in this study) on goal performance in their initial goal setting might be similar across individuals who commit themselves to initial goal setting yet do not precede sequential goals and individuals who do.

With reference to continuous goal setting, the current literature generally studies multiple goal setting which refers to different goals set by individuals over time or at the same time (Barron and Harackiewicz, 2001, Linnenbrink, 2005, Louro et al., 2007, Cheng et al., 2007). Under this context, individuals revise their goals in between goal settings for better goal performance (Taing et al., 2013) or are evaluated for their performance (Cheng et al., 2007). The other type of continuous goal setting refers to the same goal that is set continuously by an individual over time and it is about the persistence of the same goal, which is what we study in this paper. In an online context, there are more opportunities for individuals to perform the same behaviour than in an offline context because the online service is always there regardless of time and space (Khansa et al., 2015). Especially, when a habit is established, the activation of goals related to a certain behaviour elicits that behaviour automatically, for example in drinking (Sheeran et al., 2005) and online community participation (Khansa et al., 2015). Guthrie and Hollensbe (2004) call for scholars to understand goal attainment over continuous goal setting over time. In summary, the literature suggests some differences between initial and continuous goal setting in terms of psychological factors and goal designs. What, however, is not clear is whether temporal landmarks assert different impacts on goal attainment between initial and continuous goal setting.

2.3 Temporal Landmarks

When it comes to setting a goal, one of the primary questions is determining the optimal time to establish such a behavioural goal. Within the academic corpus of goal setting theory, the research addressing this question is centred around the concept, and effects of, temporal landmarks (Höchli et al., 2020, Dai et al., 2014, Davydenko and Peetz, 2019). Temporal landmarks are understood as points in time with special meanings, and they can be divided into three categories: (1) those that hold importance for an individual such as their birthday; (2) landmarks that mark a date of societal significance such as the Spring Festival in Asia; and (3) landmarks based on natural events such as the full moon. Temporal landmarks offer people a fresh mental accounting period, and individuals tend to organise their memories and time perceptions around temporal landmarks (Dai and Li, 2019). In this way, temporal landmarks offer a point of reflection regarding past actions, current self and potential future scenarios, and thus, provide defined moments for a fresh start (Dai and Li, 2019).

Research in marketing and psychology has empirically demonstrated that temporal landmarks have a positive impact on motivation to set behavioural goals (e.g. Beshears et al., 2021, Cherchye et al., 2020, Davydenko and Peetz, 2019, Dai et al., 2014, Oscarsson et al., 2020). However, so far it is not known whether goal aspirations and goal setting around temporal landmarks also correspond with goal attainment. The question of when to set goals that hold is critical for designing effective health interventions that subsequently boost population-level health. Furthermore, while there exists a demonstrable positive association between personal goal setting and temporal landmarks (e.g. Höchli et al., 2020), the anticipation of an approaching landmark may cause individuals to yield their present struggles for reaching goals and decide to only start trying at the time of the temporal landmark (Koo et al., 2020). However, in certain circumstances, the anticipation of a temporal landmark can have a positive effect, as Dai and Li (2019) show that when a person reflects upon their future self and sees the current self as less favourable, they may gain motivation to pursue their behaviour goals to strive for the favourable future self-perception. This highlights the multi-faceted and complex relationships that individuals have with temporal landmarks in terms of goal setting and attainment behaviours (Davydenko and Peetz, 2019).

2.4 Hypotheses

Temporal landmarks can be viewed as points representing an end or a new beginning (Bi et al., 2021). When we focus on the fresh start effect (Dai et al., 2014), people see landmarks as denoting the start of something new, but simultaneously perhaps the end of their old habits and life. Next, drawing from goal setting theory and prior research on initial and continuous goal setting, we hypothesise the impacts of different types of temporal landmarks on goal attainment, namely on festival-related and calendar-related temporal landmarks.

2.4.1 Festival-related Temporal Landmarks

There are different types of festivals with social meanings in our society, such as (1) festivals that are associated with the fresh start effect that motivates aspirational behaviour in general (i.e. the general fresh start effect) such as New Year; and (2) festivals that are specifically created to be perceived with the fresh start effect which motivates a specific dedicated set of aspirational behaviour (Shum, 1998), such as the World No-Tobacco Day. The usage of the word "festival" is loosely adapted, which is a socially created meaningful day for a specific purpose and has a wide public perception. There are behavioural norms related to both these types of temporal landmarks.

Past research has shown that people set more goals around these landmarks (Beshears et al., 2021; Cherchye et al., 2020; Dai et al., 2014; Oscarsson et al. 2020). Social elements supporting the goal aspiration behaviour should, in theory, also boost people's commitment to keep these goals (King, 1997). For example, if a person commits to a New Year's resolution and declares it to their friends, they will have social pressure to hold on to that goal (King, 1997; Norcross and Vangerelli, 1988). Thus, we postulate that festival-related temporal landmarks with social meaning and associations to goal setting facilitate goal attainment behaviour in the case of both initial goals and continuous goals. We propose the following two hypotheses:

H1a: Festival-related temporal landmarks positively influence goal attainment behaviour when individuals set their initial goals on these landmarks.

H1b: Festival-related temporal landmarks positively influence goal attainment behaviour when individuals set their continuous goals on these landmarks.

2.4.2 Calendar-related Temporal Landmarks

Another type of temporal landmark is derived from the Gregorian calendar. Dai et al. (2014) suggest that the start of the week, the start of the month and the start of the year have positive effects on goal-setting behaviour. In addition, they also suggest that the first work days after festival-related temporal landmarks also have a positive effect on goal-setting behaviour. In these cases, however, the society-level social aspects associated with festival landmarks (e.g. New Year's resolutions that are declared to others) are missing. Instead, the main effect comes from offering a clear fresh mental accounting period, influencing the personal dimension in goal attainment (King, 1997).

Interestingly, Dai et al. (2014) suggest that the further people are from calendar-related landmarks, the less likely they are to commit to any behavioural goals. This aligns with goal setting theory research on the fresh start effect, as people are then more likely to wait for a new calendar-related landmark to set their goal and start pursuing it, and may even concede their pursuit of the current goal in favour of restarting the goal at the next temporal landmark (Koo et al., 2020). Thus, we hypothesise the following:

H2a: Calendar-related temporal landmarks positively influence goal attainment behaviour when individuals set their initial goals on these landmarks and these effects diminish as they perceive themselves to be further from a temporal landmark.

H2b: Calendar-related temporal landmarks positively influence goal attainment behaviour when individuals set their continuous goals on these landmarks and these effects diminish as they perceive themselves to be further from a temporal landmark.

3   Materials and Methods

3.1   Research Context

To examine our hypotheses, we collected our dataset from a mobile application (App) which promotes smoking cessation. The App is available on both IOS and Android platforms. This App has attracted more than 3 million downloads and there are around 80,000 active users per day. The App offers a feature, called "Daily Smoking Cessation Groups", which is automatically created by the App every day. Users of the App can participate in the smoking cessation groups without any monetary costs, and users cannot participate in more than one smoking cessation group at the same time, unless they fail or

succeed in their previous groups. Participants of smoking cessation groups need to follow the rules of smoking cessation and manually check-in online every day once enrolled in the groups. Participants are considered to be successful when they stay in the group for 135 continuous calendar days. The App designer believes that the goal of 135 days is enough to clear out physical dependence on cigarettes. Participants fail their goals if they: 1) miss a daily check-in, 2) voluntarily leave their group, or 3) confirm smoking relapse. Missing check-ins for two consecutive days results in a "failed" status on the first day when missing the check in. Leaving a group requires a double confirmation, and participants are marked as "failed" on the day they quit. Confirming a relapse also requires a secondary warning message, minimizing accidental button clicks for quitting or relapsing.

In terms of festival-related temporal landmarks, we specifically focus on the Chinese national festivals in our study, because the target App users are Chinese. In addition to the New Year (1st January), people also celebrate the Spring Festival and consider it as the start of a new year, according to the Lunar calendar. Thus, we consider both the New Year and the Chinese Lunar New Year as temporal landmarks with fresh start effects. In addition, we also consider World No-Tobacco Day (31st May), created by the Member States of the World Health Organization in 1987, as another significant day for smoking cessation. Chinese media promotes this day to reduce smoking rates.

3.2 Data Collection

We obtained a longitudinal dataset of "Daily Smoking Cessation Groups" from the App. The dataset contains information from the first group created on the 10th of May 2015 to the group created on the 31st of March 2021. Our dataset consists of 2,153 groups with 956,883 unique participants. These groups were created on 2,153 continuous calendar days and one group was created for each calendar day.

For each group, we collected the full list of participants. The data include join dates and the dates that participants either succeed or failed. We also have information on how many days participants hold on to their goals in a group. In addition, the data allow us to determine when a participant joined his or her first smoking cessation group and this participant's historical goal attainment performance. For each participant, we collected their self-reported demographics, including gender, age, smoking year, and smoking quantity. Due to the self-reporting nature of the demographics, there are missing data and possibly inaccurate data. To minimise the impact of inaccurate self-reporting data, we excluded participants whose reported age is under 18. 18 years old is set as the lower bracket as we do not study under-aged participants for their protection purpose. Further, we filtered out participants who indicated that their starting smoking age was less than 6 years old. In the end, we have 344,218 unique participants who reported their demographics and also fulfilled our filtering strategy. Participants remained completely anonymous in this study. Since the data was publicly available, we did not need to obtain data access permission for research purposes.

3.3 Variables and Measurements

Outcome Variable The outcome variable of our interests is the participants' goal attainment in terms of smoking cessation behaviour. We measure the number of days that a participant has stayed in a smoking cessation group, which represents the number of days that the participant has quitted smoking.

Independent Variables New_Year is a dummy variable indicating whether the day that $user_i$ joined a smoking cessation group is the first day of a year. Spring_Festival is a dummy variable indicating whether the day that $user_i$ joined is the Spring Festival. World_No_Tobacco_Day is a dummy variable indicating whether the day that $user_i$ joined is World No Tobacco Day. In addition to the festival-related temporal landmarks, we also consider the impact of calendar days as temporal landmarks. Specifically, first_workday is a dummy variable indicating whether the day that $user_i$ joined is the first day after a public holiday. We also include days since the start of the week, which indicates the number of days elapsed since the beginning of the current week (from =1, Monday, to = 7, Sunday). Days since the start of the month indicate the number of days elapsed since the beginning of the current month (min =1, the first day of a month, max = 31, the last day of a month). Months since the start of the year indicate the number of months elapsed since the beginning of the current year (from =1, January, to =12, December).

Controls We include a set of control variables for analyses. To study goal attainment in initial goal setting, we control for time-invariant individual characteristics such as gender (male coded as 0 and female as 1), the number of years smoked (*log_sk_year*, log-transformed), and the number of cigarettes smoked per day (log_sk_qty, log-transformed). We also control for the account registration status (*registered_account*, registered coded as 1 and unregistered as 0) to reduce the likelihood that participants may try out the App and not be fully aware of the requirement of smoking cessation groups.

We employed the fixed-effects Poisson model to study goal attainment in continuous goal setting. Because participants' previous behaviour may serve as an important indicator of current behaviour, we control for participants' historical records of attending smoking cessation groups (*pre_fail_u_r),* i.e. the number of failures (failing to stay in a group for 135 days) divided by the total number of groups joined.

For both pooled regression and fixed-effects Poisson model, we control for group historical performance: the ratio of participants' historical failure in a group (*pre_fail_g_r)*. If a participant failed once or more than once in the past, then we treat it as 1, otherwise 0. We added up this participants' failure count and divide it by the total number of group participants in that group. We control for the total number of participants in a group (*log_total_qty*, log-transformed). We also control for the effects of other public holidays (*other_national_fes*). Finally, we control for a year-fixed effect as the data range is across almost 6 years.

VARIABLES	Mean	Std. Dev.	Min	Max
days_stayed	9.451	27.1	0	135
success_dummy	.027	.163	0	1
new_year	.006	.078	0	1
spring_festival	.002	.049	0	1
world_no_tobacco_day	.004	.066	0	1
other_national_fes	.014	.118	0	1
days_elapsed_week	3.903	2.013	1	7
days_elapsed_month	15.544	8.854	1	31
months_elapsed_year	6.564	3.435	1	12
first_work_day	.021	.142	0	1

VARIABLES	1	2	3	4	5	6	7	8	9	10
days_stayed	1.000									
success_dummy	0.775	1.000								
new_year	0.034	0.028	1.000							
spring_festival	0.004	0.003	-0.004	1.000						
world_no_tobacco_day	0.010	0.007	-0.005	-0.003	1.000					
other_national_fes	0.010	0.007	-0.009	-0.006	-0.008	1.000				
days_elapsed_week	-0.006	-0.004	-0.021	0.012	0.032	-0.002	1.000			
days_elapsed_month	-0.012	-0.009	-0.128	-0.001	0.116	-0.107	0.006	1.000		
months_elapsed_year	-0.012	-0.011	-0.127	-0.069	-0.030	0.006	-0.001	0.009	1.000	
first_work_day	0.004	0.002	-0.011	-0.007	0.056	-0.017	-0.053	-0.084	-0.056	1.000

Table 1.   Descriptive Statistics and Correlation Matrix
Note: Control variables are not reported due to space limitation and are available upon request

3.4　　Empirical Model and Results

Due to the count data nature of our dependent variable – the number of days that $user_i$ has stayed in a smoking cessation group, we employ the Poisson model for the analysis. Equation (1) below outlines the model:

$$Days\_Stayed_{ij} = \alpha_i + \beta_1 \times New\_Year_{ij} + \beta_2 \times Spring\_Festival_{ij} + \beta_3 \times World\_No\_Tobacco\_Day_{ij} + \beta_4 \times First\_Workday_{ij} + \beta_5 \times Days\_Elapsed\_Week_{ij} + \beta_6 \times Days\_Elapsed\_Month_{ij} + \beta_7 \times Months\_Elapsed\_Year_{ij} + Controls_{ij} + \varepsilon_{ij} \qquad (1)$$

where i indexes the participant, j indexes the smoking cessation group that $user_i$ joined, α_i is the individual fixed effect for the fixed-effects Poisson model, ε_{ij} is the error term.

To test our hypotheses, we first perform the analysis to examine the effect of temporal landmarks on participants' initial goal attainment behaviours (i.e., participants' first participation in the smoking cessation group). For such a case, the j is equal to 1 in Equation (1) above and the model is run with standard errors clustered by group. Table 2 presents the estimation results of participants' initial goal attainment behaviour. As it is shown, the New_Year has a negative effect on the number of days that participants stayed in a smoking cessation group for both one-time and multiple joiners in their first groups (β_{one_time} = -0.302, p < 0.001; $\beta_{multiple}$ = -0.270, p < 0.001). This suggests that when participants firstly join a smoking cessation group on New Year's Day, they are more likely to stay shorter in the smoking cessation groups. Similarly, the World_No_Tobacco_Day has negative and significant effects on the number of days that participants stayed in the first smoking cessation groups joined (β_{one_time} = -0.259, p < 0.001; $\beta_{multiple}$ = -0.125, p < 0.1). However, the Spring_Festival has a negative but insignificant effect on both one-time and multiple joiners' initial goal attainment behaviour. The first workday after a national holiday is negative but insignificant for one-time joiners and positive but insignificant for multiple joiners in their first groups. Thus, H1a is not supported.

Further, we find that the days since the start of a week has a positive effect ($\beta_{multiple}$ = 0.010, p < 0.001) for multiple joiners, indicating that they tend to stay shorter when attending the first smoking cessation group on Mondays. This effect is positive but insignificant for one-time joiners. The days since the start of a month has a significant and positive effect for one-time joiners (β_{one_time} = 0.001, p < 0.001), indicating that one-time joiners are likely to stay longer in their first smoking cessation group over the course of each month. The months since the start of a year has an insignificant and negative effect for both one-time and multiple joiners in their first groups. Thus, H2a is partially supported.

VARIABLES	(1) One Time Joiners	(2) Multiple Joiners 1st Group
new_year	-0.302***	-0.270***
	(-5.62)	(-2.95)
spring_festival	-0.036	0.068
	(-0.32)	(0.47)
world_no_tobacco_day	-0.259***	-0.125*
	(-5.83)	(-1.85)
other_national_fes	0.027	0.078*
	(0.34)	(1.74)
days_elapsed_week	0.002	0.010***
	(0.75)	(3.03)
days_elapsed_month	0.001***	-0.001
	(2.61)	(-0.73)
months_elapsed_year	-0.002	-0.004
	(-0.82)	(-1.11)
first_work_day	-0.046	0.029
	(-1.60)	(0.63)

log_total_qty	0.342***	0.232***
	(9.00)	(4.85)
pre_fail_g_r	0.518***	0.256
	(2.98)	(0.96)
gender	-0.097***	-0.150***
	(-5.21)	(-5.05)
log_sk_qty	0.098***	0.030**
	(13.90)	(2.53)
log_sk_year	0.548***	0.384***
	(83.83)	(36.19)
registered_account	0.684***	0.533***
	(14.76)	(5.06)
Constant	-1.759***	-0.245
	(-6.51)	(-0.67)
Year FE	YES	YES
Observations	231,324	112,894
Pseudo R2	0.0748	0.0295

Dependant Variable: Days_Stayed
Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2.   Estimation Results of Initial Goal Attainment

Further, we perform fixed-effects Poisson model estimation to test the effects of temporal landmarks on participants' continuous goal attainment behaviour with robust standard error. Table 3 presents the analysis results. We progressively hierarchically add variables. Specifically, model (1) only incorporates control variables. In addition to controls, model (2) includes the festival-related temporal landmarks, and model (3) includes the calendar-related temporal landmarks. Finally, model (4) is the integrated model including all the variables. As it is shown in Table 3, we find that New_Year has a positive effect on the number of days that participants stayed in a smoking cessation group (β = 0.173, p < 0.001). It suggests that when participants join a smoking cessation group on New Year's Day, they are more likely to stay longer in the smoking cessation group. Similarly, the Spring_Festival and World_No_Tobacco_Day have positive and significant effects on the number of days that participants stayed in a smoking cessation group ($\beta_{Spring\_Festival}$ = 0.260, p < 0.001; $\beta_{World\_No\_Tobacco\_Day}$ = 0.190, p < 0.001). Thus, H1b is supported.

Further, we find that the first_workday has a negative effect (β = -0.050, p < 0.001), indicating that individuals tend to stay shorter when attending a smoking cessation group on the first workday after a festival. The days since the start of a week have a significant and positive effect (β = 0.008, p < 0.001), indicating that individuals tend to stay longer in a smoking cessation group as each week proceeds. The days since the start of a month and the months since the start of a year have a significant and negative effect ($\beta_{Days\_Elapsed\_Month}$ = -0.002, p < 0.001; $\beta_{Months\_Elapsed\_Year}$ = -0.027, p < 0.001), indicating that the number of days participants stayed in non-smoking status in a smoking cessation group decreases over the course of each month and each year. Thus, H2b is partially supported.

VARIABLES	(1) Controls Only	(2) Festival	(3) Calendar	(4) Full Model
new_year		0.534***		0.173***
		(25.24)		(7.11)
spring_festival		0.430***		0.260***
		(12.33)		(7.35)
world_no_tobacco_day		0.260***		0.190***
		(9.33)		(6.56)
other_national_fes		0.166***		0.091***
		(10.29)		(5.58)
days_elapsed_week			0.010***	0.008***
			(8.64)	(7.41)
days_elapsed_month			-0.002***	-0.002***
			(-6.25)	(-6.68)
months_elapsed_year			-0.031***	-0.027***
			(-33.64)	(-24.84)
first_work_day			-0.051***	-0.050***
			(-3.30)	(-3.16)
log_total_qty	0.403***	0.203***	0.510***	0.417***
	(28.96)	(13.43)	(36.09)	(23.82)
pre_fail_g_r	0.022	-0.464***	0.778***	0.471***
	(0.47)	(-9.27)	(14.87)	(7.76)
pre_fail_u_r	0.022***	0.033***	0.045***	0.047***
	(2.84)	(4.22)	(5.84)	(5.98)
Participant FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	1,784,719	1,784,719	1,784,719	1,784,719
Number of uid	178,357	178,357	178,357	178,357
AIC	2.400e+07	2.400e+07	2.400e+07	2.400e+07
BIC	2.400e+07	2.400e+07	2.400e+07	2.400e+07

Dependant Variable: Days_Stayed
Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.   Estimation Results of Continuous Goal Attainment

3.5   Additional Analysis

We conduct further analyses to corroborate our main results. Specifically, we employ alternative operationalization of outcome variables to test the effects of two types of temporal landmarks on individuals' initial and continuous goal attainment behaviour. Instead of measuring the number of days that participants stayed in a smoking cessation group, we capture whether individuals succeed or not in a smoking cessation session (Success_Dummy is 1 if a participant successfully stayed 135 days in a group, otherwise 0). The results for initial goal attainment and for continuous goal attainment are presented in Table 4 and Table 5 respectively. The results are basically consistent with our main results.

VARIABLES	(1) One Time Joiners	(2) Multiple Joiners 1st Group
new_year	-0.411***	-0.438**
	(-4.07)	(-2.51)
spring_festival	-0.151	-0.088
	(-0.80)	(-0.28)
world_no_tobacco_day	-0.392***	-0.155
	(-5.16)	(-1.12)
other_national_fes	-0.011	0.131*
	(-0.08)	(1.66)
days_elapsed_week	-0.009*	0.010
	(-1.68)	(1.41)
days_elapsed_month	0.003**	-0.000
	(2.39)	(-0.05)
months_elapsed_year	-0.010**	-0.017**
	(-2.56)	(-2.53)
first_work_day	-0.108*	0.101
	(-1.72)	(1.34)
log_total_qty	0.464***	0.311***
	(5.95)	(3.14)
pre_fail_g_r	0.893***	1.017*
	(3.16)	(1.96)
gender	-0.101**	-0.122*
	(-2.24)	(-1.91)
log_sk_qty	0.184***	0.140***
	(11.55)	(5.54)
log_sk_year	1.023***	0.776***
	(62.03)	(32.43)
registered_account	1.474***	0.741***
	(9.55)	(3.00)
Constant	-10.511***	-8.269***
	(-18.49)	(-10.74)
Year FE	YES	YES
Observations	231,324	112,894
Pseudo R2	0.0571	0.0315

Dependant Variable: Success_Dummy
Robust z-statistics in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4. *Estimation Results of Initial Goal Attainment*

VARIABLES	(1) Controls Only	(2) Festival	(3) Calendar	(4) Full Model
new_year		1.213***		0.351***
		(20.77)		(5.13)
spring_festival		0.585***		0.155
		(5.54)		(1.44)
world_no_tobacco_day		0.340***		0.136*
		(4.35)		(1.67)
other_national_fes		0.233***		0.062
		(4.72)		(1.24)
days_elapsed_week			0.012***	0.010***
			(3.47)	(2.86)
days_elapsed_month			-0.003***	-0.003***
			(-3.67)	(-3.51)
months_elapsed_year			-0.075***	-0.067***
			(-30.75)	(-23.39)
first_work_day			-0.049	-0.032
			(-1.08)	(-0.70)
log_total_qty	0.569***	0.124***	0.789***	0.626***
	(16.35)	(3.02)	(21.48)	(12.97)
pre_fail_g_r	-1.084***	-2.123***	0.735***	0.236
	(-8.35)	(-15.19)	(5.06)	(1.35)
pre_fail_u_r	1.230***	1.255***	1.295***	1.296***
	(53.78)	(54.65)	(56.04)	(56.05)
Participant FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	336,811	336,811	336,811	336,811
Number of uid	26,349	26,349	26,349	26,349
AIC	104546	104102	103545	103525
BIC	104642	104241	103684	103708

Dependant Variable: Success_Dummy
z-statistics in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 5.   Estimation Results of Continuous Goal Attainment

We also perform sensitivity tests for our fixed-effects Poisson model. There is an extreme but unlikely possibility that all participants who set their continuous goals only set their initial goals on festival-related temporal landmarks and only set their subsequent goals on non-festival-related temporal landmarks. Under such an extreme scenario, it would indicate that these landmarks only have a positive and significant effect on their initial goal attainment, in comparison to their subsequent goal attainment. To address this concern, we reran our models to ensure that at least one subsequent goal was set on festival-related temporal landmarks. To do this, we employed three techniques respectively by dropping 1) multiple joiners completely whose initial goals were set on these landmarks, 2) multiple joiners' first observation if they had their initial goals set on these landmarks, and 3) the first two observations for all multiple joiners. The results are basically consistent with our main results. Due to space limitations, these untabulated results are available on request.

4   Discussion and Conclusion

Our main findings can be described as follows. Regarding H1a, our results showed that, when participants set their goal for the first time on a festival-related temporal landmark, they are more likely to concede in comparison to other participants setting the goal on another date. This has important implications for the "fresh start effect" literature within goal setting and goal attainment theories (see

e.g. Dai et al., 2014; Davydenko and Peetz, 2019; Höchli et al., 2020). We show that while participants on average are more likely to commit to goals around temporal landmarks, as also demonstrated by prior work, making goals on festival-related temporal landmarks can have a negative effect on goal attainment in their very first goal setting. We explain this finding by postulating that those setting a goal for the first time on festival-related landmarks are impulsive individuals who are motivated by these landmarks for setting their goals. However, regarding H1b when it comes to continuous goal setting, goal attainment is positively influenced by festival-related landmarks. It is possible that participants are more dedicated to their goal setting and are motivated by these landmarks in their sequential attempts as "the right moment has come". Regarding H2, the "fresh start effect" carried by calendar-related temporal seems to work somewhat differently for one-time joiners and multiple joiners in their first groups. One possible explanation is that two types of participants may have different cognitive characteristics formed before their first group participation. We also found inconsistent impacts of within calendar-related temporal landmarks (i.e. days of a week, days of a month, and months of a year) on goal attainment behaviour in our study. This finding is different from Dai et al. (2014) who show a consistently positive impact of calendar-related temporal landmarks on goal setting behaviour across days elapsed week, days elapsed month, and months elapsed year. It is possible that within calendar-related temporal landmarks have a different mechanism on goal setting and goal attainment behaviours.

Our findings have the following theoretical contributions. First, this research contributes to goal setting theory (Locke and Latham, 2006) by focusing on the effects of temporal landmarks on goal attainment. We further distinguish the differences in the effects of temporal landmarks on goal attainment through separating initial goal setting and continuous goal setting. By providing data and insights into these phenomena through a real-world information system for supporting smoking cessation, we also contribute to the IS literature, specifically the e-health discipline (Khansa et al., 2015). System designers looking for theory-guided approaches to motivate users via information systems to attain goals can draw from our findings to support users' desired behaviours.

Our work also has several practical implications. Our contributions to the improved understanding of the effects of temporal landmarks on goal attainment can marginally advance existing behaviour change support systems (Oinas-Kukkonen, 2013). As we have shown that temporal landmarks work differently on goal attainment depending on initial and continuous goal setting, this suggests that "all size fits all" does not work in practice. Information system designers, therefore, should adopt different motivation strategies for individuals who start their first goal and who start sequential goals after pursuing their initial goal. For example, information system designers can send custom push notifications to invite further participation on positive temporal landmarks to individuals who have already made their first attempt in the past. Commercial organisations and NGOs can also benefit from our findings in creating and promoting their own festival-related temporal landmarks. For example, WHO can send a positive vibe and bring hope to individuals who suffer from smoking relapse by indicating that these individuals are more likely to make progress if they start on World No-Tobacco Day.

Our study has several limitations. First, we collected the data from a single solution: a smoking cessation application. Thus, the data was connected to this solution, and the population using this solution. This means any between-systems comparisons were not possible, which would be needed to expand our analysis to understand the effects of information systems on observed behaviours. Similarly, we did not study different types of information systems with different characteristics. Thus, we encourage future research to reproduce similar analyses in the context of other similar information systems to explore the generalisability of this research. Second, in our analysis, we focused on performance goals rather than learning goals. Recent research on goal setting theory has underscored the importance of this distinction (Swann et al., 2021). Hence, our findings should only be understood in the context of performance-based goal attainment. In addition to future work related to addressing these limitations, we encourage studies to look at personal landmarks. In our data, we did not have access to the participants' birthdays or other important personal life events, but these may be important providers of the fresh start effect (Dai et al., 2014).

References

Baha, M. & Le Faou, A.-L. 2010. Smokers' reasons for quitting in an anti-smoking social context. *Public Health,* 124**,** 225-231.

Barron, K. E. & Harackiewicz, J. M. 2001. Achievement goals and optimal motivation: testing multiple goal models. *Journal of Personality and Social Psychology,* 80**,** 706.

Beshears, J., Dai, H., Milkman, K. L. & Benartzi, S. 2021. Using fresh starts to nudge increased retirement savings. *Organizational Behavior and Human Decision Processes,* 167**,** 72-87.

Bi, S., Perkins, A. & Sprott, D. 2021. The effect of start/end temporal landmarks on consumers' visual attention and judgments. *International Journal of Research in Marketing,* 38**,** 136-154.

Borrelli, B. & Mermelstein, R. 1994. Goal setting and behavior change in a smoking cessation program. *Cognitive Therapy and Research,* 18**,** 69-83.

Buczkowski, K., Marcinowicz, L., Czachowski, S. & Piszczek, E. 2014. Motivations toward smoking cessation, reasons for relapse, and modes of quitting: results from a qualitative study among former and current smokers. *Patient Preference and Adherence***,** 1353-1363.

Butler, R. 2006. Are mastery and ability goals both adaptive? Evaluation, initial goal construction and the quality of task engagement. *British Journal of Educational Psychology,* 76**,** 595-611.

Chaiton, M., Diemert, L., Cohen, J. E., Bondy, S. J., Selby, P., Philipneri, A. & Schwartz, R. 2016. Estimating the number of quit attempts it takes to quit smoking successfully in a longitudinal cohort of smokers. *BMJ Open,* 6**,** e011045.

Cheng, M. M., Luckett, P. F. & Mahama, H. 2007. Effect of perceived conflict among multiple performance goals and goal difficulty on task performance. *Accounting & Finance,* 47**,** 221-242.

Cherchye, L., De Rock, B., Griffith, R., O'connell, M., Smith, K. & Vermeulen, F. 2020. A new year, a new you? Within-individual variation in food purchases. *European Economic Review,* 127**,** 103478.

Chiou, W.-B. & Wu, W.-H. 2017. Episodic future thinking involving the nonsmoking self can induce lower discounting and cigarette consumption. *Journal of Studies on Alcohol and Drugs,* 78**,** 106-112.

Choi, B. C., Pak, A. W. & Choi, J. C. 2007. Daily step goal of 10,000 steps: a literature review. *Clinical and Investigative Medicine***,** E146-E151.

Cron, W. L., Slocum, J., John W, Vandewalle, D. & Fu, Q. 2005. The role of goal orientation on negative emotions and goal setting when initial performance falls short of one's performance goal. *Human Performance,* 18**,** 55-80.

Dai, H. & Li, C. 2019. How experiencing and anticipating temporal landmarks influence motivation. *Current Opinion in Psychology,* 26**,** 44-48.

Dai, H., Milkman, K. L. & Riis, J. 2014. The fresh start effect: Temporal landmarks motivate aspirational behavior. *Management Science,* 60**,** 2563-2582.

Dai, H., Milkman, K. L. & Riis, J. 2015. Put your imperfections behind you: Temporal landmarks spur goal initiation when they signal new beginnings. *Psychological Science,* 26**,** 1927-1936.

Dai, H., Saccardo, S., Han, M. A., Roh, L., Raja, N., Vangala, S., Modi, H., Pandya, S., Sloyan, M. & Croymans, D. M. 2021. Behavioural nudges increase COVID-19 vaccinations. *Nature,* 597**,** 404-409.

Davydenko, M. & Peetz, J. 2019. Does it matter if a week starts on Monday or Sunday? How calendar format can boost goal motivation. *Journal of Experimental Social Psychology,* 82**,** 231-237.

Doran, G. T. 1981. There's a SMART way to write management's goals and objectives. *Management Review,* 70**,** 35-36.

Fishbach, A. & Dhar, R. 2005. Goals as excuses or guides: The liberating effect of perceived goal progress on choice. *Journal of Consumer Research,* 32**,** 370-377.

Guthrie, J. P. & Hollensbe, E. C. 2004. Group incentives and performance: A study of spontaneous goal setting, goal choice and commitment. *Journal of Management,* 30**,** 263-284.

Hennecke, M. & Converse, B. A. 2017. Next week, next month, next year: How perceived temporal boundaries affect initiation expectations. *Social Psychological and Personality Science,* 8**,** 918-926.

Höchli, B., Brügger, A. & Messner, C. 2020. Making New Year's resolutions that stick: Exploring how superordinate and subordinate goals motivate goal pursuit. *Applied Psychology: Health and Well‐Being,* 12**,** 30-52.

Khansa, L., Ma, X., Liginlal, D. & Kim, S. S. 2015. Understanding members' active participation in online question-and-answer communities: A theory and empirical analysis. *Journal of Management Information Systems,* 32**,** 162-203.

Kim, Y., Bhattacharya, A., Kientz, J. A. & Lee, J. H. " It Should Be a Game for Fun, Not Exercise": Tensions in Designing Health-Related Features for Pokémon GO. Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, 2020. 1-13.

King, I. M. 1997. King's theory of goal attainment in practice. *Nursing Science Quarterly,* 10**,** 180-185.

Koivisto, J. & Hamari, J. 2019. The rise of motivational information systems: A review of gamification research. *International Journal of Information Management,* 45**,** 191-210.

Koo, M., Dai, H., Mai, K. M. & Song, C. E. 2020. Anticipated temporal landmarks undermine motivation for continued goal pursuit. *Organizational Behavior and Human Decision Processes,* 161**,** 142-157.

Linnenbrink, E. A. 2005. The Dilemma of Performance-Approach Goals: The Use of Multiple Goal Contexts to Promote Students' Motivation and Learning. *Journal of Educational Psychology,* 97**,** 197.

Locke, E. A. & Latham, G. P. 2006. New directions in goal-setting theory. *Current Directions in Psychological Science,* 15**,** 265-268.

Locke, E. A., Shaw, K. N., Saari, L. M. & Latham, G. P. 1981. Goal setting and task performance: 1969–1980. *Psychological Bulletin,* 90**,** 125.

Lorencatto, F., West, R., Bruguera, C., Brose, L. S. & Michie, S. 2016. Assessing the quality of goal setting in behavioural support for smoking cessation and its association with outcomes. *Annals of Behavioral Medicine,* 50**,** 310-318.

Louro, M. J., Pieters, R. & Zeelenberg, M. 2007. Dynamics of multiple-goal pursuit. *Journal of Personality and Social Psychology,* 93**,** 174.

Lozano, B. E., Stephens, R. S. & Roffman, R. A. 2006. Abstinence and moderate use goals in the treatment of marijuana dependence. *Addiction,* 101**,** 1589-1597.

Mann, T., De Ridder, D. & Fujita, K. 2013. Self-regulation of health behavior: social psychological approaches to goal setting and goal striving. *Health Psychol,* 32**,** 487-98.

Mcewan, D., Harden, S. M., Zumbo, B. D., Sylvester, B. D., Kaulius, M., Ruissen, G. R., Dowd, A. J. & Beauchamp, M. R. 2016. The effectiveness of multi-component goal setting interventions for changing physical activity behaviour: a systematic review and meta-analysis. *Health Psychology Review,* 10**,** 67-88.

Oinas-Kukkonen, H. 2013. A foundation for the study of behavior change support systems. *Personal and Ubiquitous Computing,* 17**,** 1223-1235.

Oscarsson, M., Carlbring, P., Andersson, G. & Rozental, A. 2020. A large-scale experiment on New Year's resolutions: Approach-oriented goals are more successful than avoidance-oriented goals. *Plos One,* 15**,** e0234097.

Park, M., Song, R. & Jeong, J.-O. 2017. Effect of goal attainment theory based education program on cardiovascular risks, behavioral modification, and quality of life among patients with first episode of acute myocardial infarction: Randomized study. *International Journal of Nursing Studies,* 71**,** 8-16.

Peetz, J. & Wilson, A. E. 2013. The post-birthday world: Consequences of temporal landmarks for temporal self-appraisal and motivation. *Journal of Personality and Social Psychology,* 104**,** 249-266.

Perkins, K. A. & Scott, J. 2008. Sex differences in long-term smoking cessation rates due to nicotine patch. *Nicotine & Tobacco Research,* 10**,** 1245-1251.

Sheeran, P., Aarts, H., Custers, R., Rivis, A., Webb, T. L. & Cooke, R. 2005. The goal‐dependent automaticity of drinking habits. *British Journal of Social Psychology,* 44**,** 47-63.

Shum, M. S. 1998. The role of temporal landmarks in autobiographical memory processes. *Psychological Bulletin,* 124**,** 423.

Siru, R., Hulse, G. K. & Tait, R. J. 2009. Assessing motivation to quit smoking in people with mental illness: a review. *Addiction,* 104**,** 719-733.

Smit, E. S., Hoving, C., Schelleman-Offermans, K., West, R. & De Vries, H. 2014. Predictors of successful and unsuccessful quit attempts among smokers motivated to quit. *Addictive Behaviors,* 39**,** 1318-1324.

Smith, P. H., Bessette, A. J., Weinberger, A. H., Sheffer, C. E. & Mckee, S. A. 2016. Sex/gender differences in smoking cessation: a review. *Preventive Medicine,* 92**,** 135-140.

Strecher, V. J., Seijts, G. H., Kok, G. J., Latham, G. P., Glasgow, R., Devellis, B., Meertens, R. M. & Bulger, D. W. 1995. Goal setting as a strategy for health behavior change. *Health Education Quarterly,* 22**,** 190-200.

Struik, L. L. & Baskerville, N. B. 2014. The role of Facebook in Crush the Crave, a mobile-and social media-based smoking cessation intervention: qualitative framework analysis of posts. *Journal of Medical Internet Research,* 16**,** e3189.

Swann, C., Rosenbaum, S., Lawrence, A., Vella, S. A., Mcewan, D. & Ekkekakis, P. 2021. Updating goal-setting theory in physical activity promotion: a critical conceptual review. *Health Psychology Review,* 15**,** 34-50.

Taing, M. U., Smith, T., Singla, N., Johnson, R. E. & Chang, C. H. 2013. The relationship between learning goal orientation, goal setting, and performance: A longitudinal study. *Journal of Applied Social Psychology,* 43**,** 1668-1675.

Ussher, M., West, R., Mcewen, A., Taylor, A. & Steptoe, A. 2003. Efficacy of exercise counselling as an aid for smoking cessation: a randomized controlled trial. *Addiction,* 98**,** 523-532.

Van Den Putte, B., Yzer, M. C. & Brunsting, S. 2005. Social influences on smoking cessation: a comparison of the effect of six social influence variables. *Preventive Medicine,* 41**,** 186-193.

Webb, T. L., Sniehotta, F. F. & Michie, S. 2010. Using theories of behaviour change to inform interventions for addictive behaviours. *Addiction,* 105**,** 1879-1892.

Weintraub, J., Cassell, D. & Depatie, T. P. 2021. Nudging flow through 'SMART'goal setting to decrease stress, increase engagement, and increase performance at work. *Journal of Occupational and Organizational Psychology,* 94**,** 230-258.

Williams, G. G., Gagné, M., Ryan, R. M. & Deci, E. L. 2002. Facilitating autonomous motivation for smoking cessation. *Health Psychology,* 21**,** 40.

Williams, K. J., Donovan, J. J. & Dodge, T. L. 2000. Self-regulation of performance: Goal establishment and goal revision processes in athletes. *Human Performance,* 13**,** 159-180.

World Health Organization. 2020. *WHO launches year-long campaign to help 100 million people quit tobacco* [Online]. Available: https://www.who.int/news/item/08-12-2020-who-launches-year-long-campaign-to-help-100-million-people-quit-tobacco#:~:text=Worldwide%20around%20780%20million%20people,make%20a%20successful%20quit%20attempt. [Accessed 29/03/2023].

World Health Organization. 2022. *Tobacco* [Online]. Available: https://www.who.int/news-room/fact-sheets/detail/tobacco#:~:text=Tobacco%20kills%20more%20than%208,%2D%20and%20middle%2Dincome%20countries [Accessed 29/03/2023].