

Underestimating Habits: Explanations of Habitual Behaviour in the Adult Population

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Abstract

Much of human behaviour is shaped by habits. Nevertheless, people may underestimate the role of habit and claim explanations of behaviour that hold a sense of self-agency in favour of internal states such as fatigue. In a snapshot study of adults' daily coffee consumption habits, we explored this misattribution hypothesis. The findings uncovered inconsistencies between actual and attributed behavioural influences: Participants' attributions for their behaviour placed more emphasis on internal state, but habit strength performed better than internal state in predicting behaviour. Despite being encouraged for accuracy, participants continued to underestimate the role of habit. The current research provides a discussion on how this pattern of attribution may lead to adverse influences on the ability to effectively self-regulate.

Keywords: attribution, habits, automaticity, cognitive bias, lay beliefs

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Introduction

Habits play a crucial role in our ability to function efficiently in our daily lives. By automating recurrent behaviours, habits allow people to study consistently, eat a well-balanced diet, remain fit, and get adequate sleep (Galla & Duckworth, 2015). Furthermore, enhanced feelings of safety and even meaning in one's life is linked to the engagement in routine behaviours (Avni-Babad, 2011; Heintzlmann & King, 2019). Daily habits also make it possible to multitask: In a daily experience study, 43% of everyday behaviours were habitual, that is, they often recurred in the same context where participants were likely to think about something other than the behaviour they were performing (Wood et al., 2002).

Context Cues for Habit Learning and Performance

Habits are cognitive associations between context and response that are developed through the repetition of rewarding responses in specific contexts (Knowlton & Diedrichsen, 2018; Wood & Runger, 2016). After habit associations are formed in memory, context cues activate the response. People typically act on habitual behaviours when triggering conditions are present (Mazar & Wood, 2018). William James' (1890) ideomotor theory posits that when a behaviour is activated, it is more likely that one will engage in it. That is, "every representation of a movement awakens in some degree the actual movement which is its object" (p. 526).

A range of environmental elements that covaries with the response, such as internal states, other people, physical locations and sequential past behaviours, to complex conjunctions that involve several such factors constitute the context cues that activate habits. Much like routine behaviour, responses are activated by the state of the environment and the individual's present internal state simultaneously (Botvinick & Plaut, 2004). For instance, brewing a pot of coffee while standing at the counter in the kitchen could be part of a

typical routine in the morning. This, combined with morning fatigue may cue the behaviour of scanning through articles in the newspaper.

The cuing of a response by a context is supported by a number of psychological mechanisms. Aspects of a performance context (e.g. coffeepot) that guided previous behaviours and rewards automatically capture the attention of the individual (Anderson, 2016). With increased experience, behaviours are linked to other similar cues (e.g. kitchen table) that are tied to reward, rather than a particular cue at a particular location and time (e.g. kitchen counter). Furthermore, as habits are activated repeatedly, alternative responses may become more difficult to access which yields a potential biased search for information (Danner et al., 2007; McCulloch et al., 2008; Verplanken et al., 1997). Habit performance is also influenced by individuals that may attribute intentionality to their habits, mistakenly ascribing external cues of cognition to their own inner desires and preferences (Loersch & Payne, 2011). Habits are also increasingly relied upon as a result of external factors that reduce decision-making abilities to take action due to low willpower, distraction, and stress (Neal et al., 2013; Vohs et al. 2005).

A lexical decision task with runners provides evidence that context cues trigger habit responses in mind (Neal et al., 2012). After subliminal priming of the areas where participants frequently ran, runners with strong habits for running were quicker to recognise the words "jogging" and "running." Running as a habitual response was tied to memory of performance contexts. However, the individuals' personal running goals (e.g., relax, weight) did not activate running. Running was only activated by personal goals in participants that were still forming their habits for running. In order to increase participant's motivation to exercise, it is likely they needed to think about these goals.

In sum, habitual behaviour becomes linked to contexts, such that when the cue is perceived, the behaviour is automatically activated. As people perform that behaviour, habits are subsequently formed (Wood, 2017).

Lay Beliefs About Habits

The well-established psychological premise that our beliefs and attitudes do not precede our behaviours but follow from them is one of the classic issues brought to the forefront in the study of habits (Weir, 2012). One might assume that lay theories provide accurate explanations for habitual behaviour considering the numerous opportunities people have in their day-to-day lives to observe their own actions repeatedly over time. However, people's explanations for their habits tend to be relatively devoid of the actual psychological processes that generate the response (Gardner, 2015). In other words, given that people frequently become aware of their repetitive patterns of behaviour, such as the type of food eaten for breakfast or the route taken to college or work each morning, they have little introspective access into the cuing mechanisms that underlie these behaviours. When acting out of habit, cognition about performing a behaviour mostly happens downstream, after the performance of a behaviour, rather than upstream, as a guide for taking action (Wood, 2017). In an experiment, participants had read about an employee that locked a coworker in the office by twisting the door knob anticlockwise (Gershman et al., 2016). Findings revealed that participants who also had their own house doors open in the same anticlockwise direction as the employee were less likely to place blame on them, demonstrating that participants had attributed the employees actions to habit. The actor-observer effect is also relevant, suggesting that individuals often attribute their own behaviour to influences in the environment, but not the behaviour of others (Jones & Nisbett, 1971). In consequence, people may attribute their own behaviours to habits, as habits are activated by environmental cues.

Action explanations have long been studied in social and personality psychology, for example, self-perception theory (Bem, 1972). But currently, very little research is being carried out to assess behaviour (Baumeister et al., 2007). In line with current developments, people's explanations for their behaviours is much less researched in this domain (Carden & Wood, 2018). Our top journals do not feature recently conducted research that assesses action explanations, with only a few exceptions that are noteworthy (Bar-Anan et al., 2010). Research studies on this subject places more emphasis on sensorimotor experience and lower level motor control mechanisms (Yoshie & Haggard, 2013), than higher level lay theories of behaviour (Wood, 2017).

People may frequently generate explanations for their behaviours given that habits are prevalent in everyday life (Wood et al., 2002). Causal explanations are indeed inferences after a response has been automatically performed with little conscious thought. Generally, these causal explanations tend to overweight personal intentions (i.e., active goal pursuit) above cues in the environment that activate behaviour (Wood, 2017). Therefore, there is sufficient evidence to suggest that people do not take habit into consideration in their accounts for their individual recurrent, habitual behaviours. In self-judgments, people place an excessive emphasis on introspections (i.e. one's emotions and thoughts) (Pronin, 2009); and by default they attribute intentionality to actions (Rosset, 2008). Volitional terms are used to explain a number of daily habits. In one study, smokers claimed that negative affective states triggered their smoking habits, despite the fact that momentary affect assessments found minimal correlation between negative affectivity and smoking later on. These findings illustrate the overattribution of inner states to behaviour (Shiffman et al., 1997). Other research revealed a weak daily correlation between negative emotions and snacking in self-described emotional eaters (Adriaanse et al., 2011). Additionally, participants with stronger habitual behaviours expressed greater certainty in their behavioural

intentions and believed their goals were driving their behaviour, despite individual's intentions and goals being weak predictors of strong habits (Ji & Wood, 2007; Neal et al., 2012). Collectively, these findings indicate that people may underestimate the role of habit and overestimate the influence of internal states on behaviour. Therefore, people's volitional explanations for the performance of habitual behaviours are largely inaccurate.

A longitudinal study involving participants with new gym memberships also revealed inferences that habitual behaviours are goal-directed (Armitage, 2005). During the first three months of membership, participants' intentions increased the more frequently they attended the gym (maintaining initial intentions constant). However, intentions were not predictive of gym attendance after the fifth week of research. The individuals' habits that were developed during the initial few weeks of attending the gym, instead, predicted how often they would go to the gym. Therefore, participants' intentions to attend the gym increased as they went more frequently. But, because these intentions did not predict behaviour overall, they were considered epiphenomena. Only habit was found to predict behaviour.

There are several aspects of habitual action that give rise to such intentions. The frequency of performing a behaviour suggests personal intentions to actively pursue goals. It is plausible for people to assume that they must intend to perform a behaviour, if they continue to repeat it. In addition, the tight linkage between intention and the sensory experience of behaviour contributes to beliefs about personal causation (Haggard, 2017). If a person can establish a feeling of doing for performing an action, they infer intention. Furthermore, actions that have predictable outcomes, such as habits, are more likely to be interpreted as intentional by people (Wegner & Wheatley, 1999). Also, people may believe that habitual behaviours provides insight into the self and reflects an individual's most authentic self due to their inaccessible, uncontrolled nature (Morewedge et al., 2014). Lastly, it is plausible that self-inferences regarding habitual action are historically accurate. That is to

say, as people form habits, they may recall the intentions that guided the behaviour initially (Wood, 2017).

The positive affective state that is linked to many habits also cause self-inferences to emerge about intention. This view may indeed reflect reasoned judgement about performance ease compared to more unfamiliar behaviours. To illustrate, customers favoured using outdated products and services instead of newer versions due to the difficulties of learning new usage behaviours (Murray & Häubl, 2007). The ease, and speed or fluency of processing that is linked to actions that are performed frequently, increases the likelihood of habits being positively evaluated. Success at processing and feelings of familiarity may lead to positive emotions that permeate day-to-day activities (Reber et al., 2004). Also, people feel more in control of their behaviour and are more likely to infer personal intention when actions are selected and executed with ease (Chambon & Haggard, 2012). Thus, beliefs about habit take advantage of a psychological calculus that favours actions that demonstrate ease as they have been sufficiently practiced over actions that demonstrate difficulty as they are new and unfamiliar. People may naturally generate inferences that they must have chosen to take habitual action to accomplish plans and goals if they are favorable towards habits for these reasons (Wood, 2017).

However, it is possible that behaviors that result in undesirable consequences are not attributed to one's own volition. Automatic responses that go against social or personal standards may be attributed to mitigating factors (Parks- Stamm et al., 2010). To provide an example, when participants were primed to consume chocolate, those on a diet felt guilty and blamed their consumption on task demands (Adriaanse et al., 2014). In short, people may display heightened sensitivity to contextual factors that encourage unhealthy habitual behaviours.

Various implications can derive from volitional inferences about habit (Wood, 2017). By keeping goals and behaviour in line, these beliefs may aid in self-regulation (Yoshie & Haggard, 2013). Aligning goals with actions can also lead to regulatory success, even though this perspective is in contrast to the typical concept of self-regulation in which behaviour is changed to accomplish goals. Furthermore, volitional beliefs about habits may enhance wellbeing (Wood & Neal, 2007). To provide an example, even if students' decisions to repeatedly sit in the same seats in class may have been mostly random at first, doing so increased their feelings of control, certainty and comfort (Avni-Babad, 2011). Additionally, the performance of habits encourages comprehensibility or coherence of experiences, which contributes to one's meaning in life (Heintzelman & King, 2019). As people can always choose not to carry out the activated response, beliefs of self-control in situations are correct. However, because habitual behaviours are largely insensitive to desires and intentions, self-inferences are erroneous in terms of the psychological mechanisms underlying the response (Wood et al., 2022).

The Current Research

The current study examines a potential bias that discounts the influences of habit on patterns of behaviour. Given the numerous downstream effects of lay beliefs about behaviour (McFerran & Mukhopadhyay, 2013), it would be important to document such a bias. To illustrate, such biases may result in difficulties to effectively self-regulate as people place an excessive focus on the regulation of internal states (e.g. fatigue) and insufficient focus on employing self-regulation techniques that may be better in controlling habit by eliminating activating cues in the environment (Duckworth et al., 2016)

The current study examined the attribution bias by assessing an episode of a repeated mundane behaviour, that is coffee consumption, from the past twenty-four hours. More

precisely, coffee consumption was studied in response to three prevalent reasons for coffee consumption: habit strength, fatigue, and an internal state (see pilot below).

I anticipate that habit will have a stronger influence on actual coffee consumption than fatigue with consideration that a number of participants involved in this study will consume coffee on a regular basis. Furthermore, I anticipate that attributions made by participants will place an equal or greater emphasis on fatigue than on habits. Together, these two hypotheses investigate the correlation between the perceived and actual causal factors of behaviour. Additionally, I anticipate that within-participant relationship between fatigue and coffee consumption will be unrelated to fatigue attributions. That is to say, people's views of how their levels of fatigue determine their coffee consumption will be unrelated to the influence of fatigue on each individual's coffee consumption. Overall, this study intends to replicate and extend recent research in this field (Mazar & Wood, 2022).

Method

Pilot

A sample consisting of 31 individuals over the age of 18 (7 male, 24 female) were asked to rate the importance of six causes of coffee consumption on a 5-point Likert Scale from 1 (not at all important) to 5 (extremely important), to investigate common lay beliefs about the reasons for consuming coffee. Causes of coffee consumption included: fatigue, habit, thirst, taste, having coffee after a meal and social motives. Individuals rated the most significant causal factor for coffee drinking as fatigue ($M = 4.00$, $SD = 1.24$), which was followed by taste ($M = 3.45$, $SD = 1.00$), habits ($M = 3.13$, $SD = 1.41$), social motives ($M = 2.87$, $SD = 1.23$), drinking coffee after a meal ($M = 2.00$, $SD = 0.97$), and thirst ($M = 1.87$, $SD = 1.12$). A paired samples t-test was conducted to compare self-attributions to fatigue and habits. The difference between self-attributions to fatigue ($M = 4.00$, $SD = 1.24$) and habits ($M = 3.13$, $SD = 1.41$) was statistically significant, $t(30) = 4.23$, $p = <.001$ two tailed. The magnitude of difference in the means ($MD = 0.87$, 95% $CI [0.45, 1.29]$) was medium ($d = 0.76$).

Design

The current cross-sectional research design was quantitative in nature, employing a survey divided into three sections, capturing participant's explanations and experiences as they naturally emerge in everyday life. Data was collected online through a qualtrics survey. First, participants completed the Intake Survey (Section 1), which included measures of attributions and habit strength for their individual coffee consumption. Then, in A Snapshot of Daily Experience (Section 2), they stated their coffee consumption and levels of fatigue during their last coffee drinking episode. Additionally, they answered a brief Final Survey upon completion (Section 3).

The predictor variables (PVs) were those habit strength (SRHI), habit strength (Context-Specific), fatigue, fatigue attribution, and habit attribution, while habit strength (BFiC) was used as the Criterion variable (CV) for the main analyses. For the third hypothesis, a within-participants design was implemented to test whether the actual effect of fatigue on coffee consumption will be unrelated to fatigue attributions.

Participants

The current study consisted of a convenience sample of 220 participants (124 female, 81 male, 15 other). The minimal sample size for the current study was $n = 122$. The sample for this study was determined using Tabachnick and Fidell (2013) formula to calculate the sample size for multiple regression analysis which is as follows: $N > 50 + 8m$ (where $n =$ number of participants and $m =$ the number of PVs). The following social media platforms: Twitter, Instagram, Facebook, WhatsApp and Reddit, were used to distribute a link to the survey and a brief description of the study. Recruitment through several social media platforms ensured the sample included participants from a variety of contexts, thus, increasing the validity of responses to the research questions. Participants did not receive momentary compensation for taking part in this study. Participants were eligible to participate in this study if they were: (1) 18 or older, (2) spoke fluent English, (3) owned a device with internet access, and (4) drank coffee once a day or more. Participants also were required to give informed consent before participation. The initial sample consisted of 230 participants, however, 10 participants were excluded in the analyses for consuming coffee less than once a week. The final sample for analyses consisted of 220 participants, exceeding my projected sample size of 122.

Procedure

Social media platforms were used to recruit the majority of participants involved in this study. The survey was posted on Twitter, Instagram, Facebook, WhatsApp and Reddit. Participants were provided with a brief overview of the study including an estimated time (approximately 5 minutes) for completion, before consent was obtained through an information sheet/consent form (see Appendix A). Participants had the option to withdraw without penalty at any point during the survey by exiting the browser. The consent form clearly stated this prior to the participant completing the survey. Then, participants were asked to select the "agree" box, indicating that they had read the consent form, understood the terms, and agreed to contribute voluntarily to the research (see Appendix B). Participants were able to begin the survey once informed consent had been established. They were required to complete three sections of the study adapted by Mazar & Wood (2022): Intake Survey, A Snapshot of Daily Experience and Final Survey (see below).

Intake Survey. Participants indicated the strength of their habits for coffee consumption, attitudes and intentions towards coffee consumption, and attributions to coffee consumption. Participant's demographics were also reported after providing informed consent (see Appendix C).

A Snapshot of Daily Experience. Participants were instructed to answer a short survey asking about their daily coffee intake after completing the intake survey. To obscure the purpose of the study, a self-report item that asked about the location of the participant (e.g., *work*, *home*) was used in the short survey. Each participant rated their level of fatigue, as well as whether or not they consumed coffee in the previous twenty-four hours. Each participant also rated their mood on a self-report mood item for exploratory purposes and answered an open-response item that asked them to describe briefly the situation in which they most recently drank coffee (see Appendix D).

Final Survey. After completing A Snapshot of Daily Experience section of the study, participants were required to complete the final survey (see Appendix E). The measures included in the final survey are as follows: The context-specific habit measure and the single-event self-attribution measure (see *measures* below).

According to procedures followed by the National College of Ireland's Ethics Committee, all procedures within the current study were deemed ethically acceptable. In completion of the study, each participant was shown a debriefing form which included my supervisors' contact information and my student contact information in addition to the contact details of relevant supports (see Appendix F). In the instance a participant became uncomfortable at any point during the study or if further information and clarification was needed, they could refer to the contact information provided at the end of the form.

Measures: Intake Survey

Self-Report Habit Index (SRHI; Verplanken & Orbell, 2003; Note to minimise participant burden, the full SRHI was not included in the present study). The Self-Report Habit Index, a 10-item self-report measure, was used to directly assess participants' self-identification with drinking coffee, automaticity, and perceptions of performance repetition (Verplanken & Orbell, 2003). Participants read 10 statements and rated them on a 5-point Likert Scale from 1 (Strongly disagree) to 5 (Strongly agree). An example of an item is as follows: *Drinking coffee is something I do frequently*. Higher scores reflect stronger habits. The SRHI has demonstrated a high level of reliability (α range: .76–.90) and predictive validity (Gardner et al., 2012; Verplanken & Orbell, 2003). The Cronbach's alpha was ($\alpha = .89$) for this particular sample, indicating a satisfactory internal consistency for this scale.

Behaviour-Frequency-In-Context (BFiC; Galla & Duckworth, 2015; Ji & Wood, 2007; Ouellette & Wood, 1998). The Behaviour-Frequency-In-Context scale, a 4-item self-report measure, was used to determine how frequent participants consumed coffee and the

stability of the context in which consuming coffee was performed. Participants read 2 statements and on a scale from 1 (Never or almost Never at the same [time / location]) to 5 (Almost Always or Always at the same [time / location]), they rated how frequently they consumed coffee at the same time during the day and at the same location. In the present study, a mean habit strength score was obtained by multiplying the frequency of each participant's coffee consumption by their time and location ratings of context stability individually, and averaging both Frequency X Context scores. The items included in the scale are as follows: (i) *Which one best describes your coffee drinking frequency? For example, once a day/twice a day/3 times a day or more*, (ii) *When you drink coffee, how often is it at the same time of day? For example, in the morning or before/after a certain class*, (iii) *When you drink coffee, how often is it at the same location? For example, the same coffee shop/at home*. Higher scores reflect stronger habits. The Behaviour-Frequency-In-Context measure has demonstrated high levels of predictive validity in previous research (Ji & Wood, 2007; Ouellette & Wood, 1998; Wood, et al., 2005). Cronbach's alpha for the BFiC is generally greater than .70, showing a high level of internal consistency (Danner et al., 2008). The Cronbach's alpha was ($\alpha = .80$) for this particular sample, indicating a satisfactory internal consistency for this scale.

Self-Attribution. The Self-Attribution scale (Mazer & Wood, 2022) was used to determine participants' attributions for drinking coffee. Each participant scored how much their coffee consumption was influenced by habits and past behaviours and also fatigue on a scale from 0 to 100%. The items included in the scale are as follows: *My past behavior and habits, my energy levels and tiredness*. Coffee consumption was not influenced at all by a score of 0%, and was influenced entirely by a score of 100%. Each participant received instructions to prevent the total of both scores from exceeding 100%. Higher scores reflect stronger self-attributions.

Coffee Consumption Attitudes and Intentions. In the Coffee Consumption Attitudes and Intentions measure (Mazer & Wood, 2022), each participant scored how much they enjoyed drinking coffee on a scale from 0 (not at all) to 100 (very much). The item included in this scale is as follows: *How much do you enjoy drinking coffee?*. Participants rated their intentions to drink coffee in relation to their own self-reported frequency of intake, on a on a 5-point Likert Scale from 1 (Strongly disagree) to 5 (Strongly agree). The item included in the scale is as follows: *I intend to drink coffee _*, with the participant's self-reported frequency of coffee consumption in place of the underscore; Ajzen, 2002). Higher scores reflect stronger attitudes and intentions.

Measures: A Snapshot of Daily Experience

Fatigue. On a 5-point Likert Scale from 1 (not at all) to 6 (very), each participant indicated their tiredness during their last coffee drinking episode. The item included in the scale is as follows: *How tired were you when you last drank coffee?*. Higher scores reflect a higher level of fatigue.

Coffee Consumption. As a measure of compliance, each participant reported whether they consumed coffee within the previous twenty-four hours (No / Yes - 1 Drink / Yes - 2 Drinks / Yes - 3 Drinks or more). This self-report measure was also used to ensure that one coffee consumed over a duration of time was categorised as one incident.

Mood. On a 5-point Likert Scale from 1 (unhappy) to 5 (happy) each participant in this exploratory measure rated their mood during their last coffee drinking episode. This measure was employed to determine if attributions to habits over fatigue was correlated to positive mood state in general. The item included in the scale is as follows: *What was your mood when you last drank coffee?*. Higher scores reflect a higher level of happiness.

Situation Description (Open-Response Measure). Each participant provided a brief description (in up to 5 words) of the situation in which they most recently drank coffee in a

free response item (e.g., *with friends, going to the gym*). Descriptions of participants' situations were used in the Final Survey (see below).

Measures: Final Survey

Context-Specific Habit Measure. In the Context-Specific Habit measure (Mazer & Wood, 2022), the situation description where participants described their most recent coffee drinking event was chosen for each participant as an exploratory measure assessing habit strength. Each participant reported (i) how frequently they consumed coffee in the situation described, (ii) how automatic they believed they were consuming coffee in the situation, and (iii) how strongly they intended to consume coffee in the situation. Higher scores reflect stronger habits.

Single-Event Self-Attribution. In the Single-Event Self-Attribution measure (Mazer & Wood, 2022), each participant was presented their open-response answer of the last incident they consumed coffee, and then rated how much habit and fatigue affected their decision to consume coffee at that specific time. The wording and answer choice of the Single-Event Self-Attribution item was the same as the Self-Attribution measure in the intake survey. Participants reported if they remembered the exact event they drank coffee within the past twenty-four hours to confirm that they recalled it. This measure was used to precisely assess attributions for a particular instance of habitual behaviour. The Single-Event Self-Attribution item encouraged participants to respond with accuracy as follows: *Try to be as accurate as possible!* Higher scores reflect higher stronger self-attributions.

Demographics. To obtain a general profile of the participants involved in this study, demographic questions about age and gender were included in this section.

Results

Descriptive Statistics

The current data is taken from a sample of 220 participants ($n = 220$). This consisted of 124 female (56.4%), 81 male (36.8%), 15 other (6.8%). On average, participants consumed coffee 6-7 days a week ($M = 4.32$, $SD = 0.87$), or approximately once a day. Scores obtained from both measures assessing habit strength indicated moderate coffee consumption habits.

The descriptive statistics for nine continuous variable including habit strength (SRHI), habit strength (BFiC), fatigue attribution, habit attribution, fatigue, single-event fatigue attribution, single-event habit attribution, coffee consumption attitudes and intentions, and coffee frequency are included in Table 1 below.

Table 1

Descriptive statistics for all continuous variables.

Variable	M [95% CI]	SD	Range
Habit Strength [SRHI]	34.73 (33.60 - 35.87)	8.53	10 - 50
Habit Strength [BFiC]	171.60 (160.57 - 182.63)	83.0	1 - 313
Fatigue Attribution	50.83 (47.16 - 54.50)	27.63	0 - 100
Habit Attribution	37.48 (34.26 - 40.69)	24.21	0 - 100
Fatigue	3.10 (2.96 - 3.24)	1.09	1 - 5
Single-Event Fatigue Attribution	50.30 (46.41 - 54.19)	29.27	0 - 100
Single-Event Habit Attribution	37.90 (34.43 - 41.37)	26.08	0 - 100
Coffee Attitudes and Intentions	88.70 (86.71 - 90.70)	15.02	9 - 105
Coffee Frequency	4.32 (4.20 - 4.43)	0.87	1 - 5

Inferential Statistics

Multiple regression analysis was performed to determine how habitual coffee consumption (BFiC) could be explained by 5 variables: Habit Strength (SRHI), Fatigue, Fatigue attribution, Habit attribution, and Coffee Consumption Attitudes and Intentions. Preliminary analyses were performed to ensure no violation of the assumptions normality, linearity, and homoscedasticity. The correlations between the predictor variables were assessed and r-values ranged from -.061 to .511. Tests for multicollinearity also indicated that all Tolerance and VIF values were in an acceptable range. These results indicate that there was no violation of the assumptions of multicollinearity, and that data were suitable for examination through multiple regression analysis. The 5 predictors explained 20% of variance in Habit Strength (BFiC) scores ($F(5,214) = 10.62, p < .001$). Habit Strength (SRHI) was the only variable to uniquely predict habitual coffee consumption to a statistically significant degree. Habit Strength (SRHI) was the strongest predictor of habitual coffee consumption ($\beta = .292, p < .001$) (See Table 2 for full details).

Table 2

Multiple Regression analysis for habit strength (SRHI), fatigue, fatigue attribution, habit attribution, and coffee consumption attitudes and intentions.

Variable	R^2	B	SE	β	t	p
Model	.20					
Habit Strength [SRHI]		2.84***	.750	.292	3.78	<.001
Fatigue		-.640	5.70	-.008	-.112	.911
Fatigue Attribution		.505	.270	.168	1.87	.063
Habit Attribution		.459	.270	.134	1.70	.090
Coffee Attitudes and Intentions		.712	.399	.129	1.79	.076

Note: R^2 = R-Squared; B = unstandardised beta value; SE = Standard errors of B ; β = standardised beta value; N = 230; Statistical significance: * $p < .05$; ** $p < .01$; *** $p < .001$

To determine whether participants attributed their coffee consumption to habits more than fatigue, a paired samples t-test revealed that self-attributions to fatigue were significantly stronger than self-attributions to habits. Consistent with hypothesis, the difference between self-attributions to fatigue ($M = 50.83$, $SD = 27.63$) and habits ($M = 37.48$, $SD = 24.21$) was statistically significant, $t(219) = 4.37$, $p = <.001$ two tailed. The magnitude of difference in the means ($MD = 13.35$, 95% $CI [7.33, 19.38]$) was small (Cohen's $d = 0.29$).

The single-event attribution measure for participants' most recent event in which they drank coffee was assessed to ensure that self-attribution findings were not affected by participants' inability to recall their most recent coffee drinking episode or by ambiguities in self-attribution for many instances of a behaviour. A paired-samples t-test indicated that participants attributed the most recent event in which they drank coffee to fatigue more than habit. The difference between the single-event attributions to fatigue ($M = 50.30$, $SD = 29.27$) and habits ($M = 37.90$, $SD = 26.08$) was statistically significant, $t(219) = 3.69$, $p = <.001$ two tailed. The magnitude of difference in the means ($MD = 12.40$, 95% $CI [5.77, 19.03]$) was small ($d = 0.25$).

The current study's snapshot design allowed us to determine whether the actual effects of fatigue on coffee consumption were unrelated to self-attributions to fatigue. We examined whether participants that actually consumed coffee in response to fatigue were conscious of this association as they were more likely to attribute coffee consumption to fatigue. The relationship between levels of actual fatigue and fatigue attributions for a specific instance of behaviour was investigated using a Spearman's Rank Order correlation coefficient. There was a strong, positive correlation between the two variables ($r_s = .51$, $n = 220$, $p <.001$). Results indicate that higher levels of fatigue are related with stronger fatigue attributions.

Discussion

Participants in this study provided explanations for the cause of a common daily activity, coffee consumption, and also reported their level of fatigue and coffee consumption during their most recent coffee drinking event. The current hypotheses assessed the relationship between actual factors that influence behaviour and participants' attributions to their behaviour. Findings in the present study revealed that habit strength had a considerable effect on actual behaviour. Habit measures demonstrated consistent strong effects of habit on behaviour. If the attributions provided by participants demonstrated accuracy, habit should have been reported more or as much as fatigue. Participants, however, miscalibrated these influences on behaviour by having attributions to their coffee consumption feature fatigue more than habit.

Importantly, although specific features of research design aimed to minimise misattribution, this study uncovered a bias to discount the influence of habit on behaviour. Even when participants were encouraged to give accurate self-attributions or were asked about the most recent situation in which they drank coffee instead of their coffee consumption in general, they continued to provide inaccurate attributions. In fact, despite participants' motivation and having ample opportunities to observe their own behaviour due to how frequent they consumed coffee (once a day or more on average), inaccuracies in attributions had emerged. Since consuming coffee is a common, daily activity, that is not usually followed by an experience that is emotionally salient, further attests to the robustness of the present attribution bias.

In the current study, attributions among participants underemphasised habit and overemphasised internal state. Habits were more of a factor than inner state (fatigue, respectively), in determining participants' daily coffee consumption. Participants' explanations for their actions, however, placed more emphasis on inner state than on habit.

Thus, it appears that participants are overvaluing inner state while undervaluing habit relative to its actual behavioural influence. The current attribution pattern stands to reason given that people place an excessive emphasis on subjective personal introspection (Pronin, 2009), in addition to the motivational tendency to view behaviour as goal-oriented (Rosset, 2008). Consequently, people's attributions may be guided by shared lay perceptions about behaviour. In addition to biasing lay perceptions, this phenomenological perspective may have directed theories in psychology to overemphasise important, motivation-based factors that influence behaviour (Duckworth et al., 2016).

The snapshot method employed in this study demonstrates how the attribution bias is relevant in real-life situations and also provides evidence that supports the causal significance of habits. Moreover, the findings were replicated over three separate self-report habit strength measures: a measure of behavioural frequency in a stated context (a causal factor of habit formation) and experiences of automaticity (an outcome of habit formation); and a within-person context-specific habit measure that was exploratory in nature, which tapped into the past repeated behaviour of participants in a specific situation.

This research includes several design features that should have maximised accuracy and minimised bias among participants. Furthermore, to minimise biased recall, attributions for a specific recent behaviour was assessed. In this study, evidence of attributional bias had emerged despite participants being encouraged to give accurate self-attributions and also when participants provided explanations for a recent instance of behaviour, instead of their recurrent behaviour in general. Even when accuracy was encouraged, participants attributed their own behaviour to habit, suggesting that these attribution patterns were not caused by difficulty in understanding the habit items or allocating habit items to behaviour appropriately. Furthermore, in the pilot study, participants identified habit as a primary reason for consuming coffee.

The actor-observer effect posits that people tend to ascribe their own behaviour to factors in the environment more often than the behaviour of others (Jones & Nisbett, 1971). However, in contrast, this study revealed that participants underestimated the influence of habit on their own behaviour. Habits are not exclusive to influences in the environment as they lie in the environment that activates a habitual response as well as in an individual's acquired associations in memory (Wood & Runger, 2016). Nevertheless, even if habitual behaviour is considered a consequence of the environment, a meta-analysis on previous research revealed that attributions only manifest the actor-observer effect in certain contexts, for example, not positive events but instead negative events (Malle, 2006). The behaviour assessed in the current study was presumed to be neutral (coffee consumption). Perhaps, it is likely that people attribute negative behaviours to habits more readily, commonly referred to as 'bad habits'. To note, the current study included individuals residing predominantly in Ireland, the United Kingdom, and the United States who fluently spoke English. If self-agency beliefs cause an individual to underestimate the influence of habit on behaviour, habit underestimation in collectivistic cultures that emphasise context over individuals may be smaller (Crandall et al., 2001).

Implications

Several theoretical and practical implications can be drawn from the current research. The current study further demonstrates the possible downstream effects that may occur from the underestimation of habits that are comparable to other shared lay theories. It calls into doubt the accuracy of people's accounts of behaviour such as their failure to break undesirable habits, for example, that their inability to exercise, save money or lose weight, is mostly caused by low willpower (American Psychological Association, 2012). Previous research has indicated that difficulty altering well-established patterns of behaviour are not reflective of a person's lack of willpower or persistent desire to engage in old behaviours. The

primary issue is that contextual cues that remain constant continue to automatically activate old habits in mind (Walker et al. 2014). Old traces of one's memory are not necessarily replaced when new habits are acquired (Bouton et al. 2011). Previous routine practices and other environmental cues activate old memories of habit and can result in the inability to break old patterns of behaviour.

Interventions to date mostly encourage individuals to reflect on their behaviour with the aim of altering old patterns of behaviour. However, such strategies are frequently ineffective, which is consistent with the finding that much of human behaviour is triggered by contextual cues and automatic by nature, and leads to actions that are often performed without conscious thought. A major challenge that will inform future interventions in behaviour change is to address the importance of habit learning. Future behaviour change interventions should focus on impeding cues in the environment that trigger past, unhealthy habits and encourage the repetition of healthy, new behaviours into a habitual response (Marteau et al. 2012; Rothman et al. 2015).

The underestimation of habits also calls into doubt the efficacy of common self-regulation techniques. As a consequence of misattributing the source of behaviour, people may focus on techniques that affect internal state (e.g., reducing fatigue to reduce coffee consumption), rather than implementing strategies in situations that may change habits more effectively. The current research highlights the importance of managing exposure as it can be used as a way to modify habit cues in daily life. To provide an example, reducing the accessibility or salience of unhealthy foods can help to reduce unhealthy eating patterns (Sobal & Wansink, 2007). To illustrate, a study found that people with lower body mass index attending a Chinese buffet restricted their food intake by sitting with their backs or sides to the buffet, putting napkins on their lap, and choosing to eat with chopsticks (Wansink & Payne, 2008).

Furthermore, the opposed view that suggests situational strategies for self-regulation are merely nonsalient, may cause individuals to disregard the potential of interventions (Duckworth et al., 2016). Mazar & Wood (2022) found that participants rated their mood as more positive when habit attributions were more in line with habitual behaviour, indicating that accurate self-attributions may benefit wellbeing. It is plausible that with habit performance and recognising the currently underestimated yet prevalent role of habits in day-to-day life, general wellbeing increases (Heintzelman & King, 2019).

Limitations and Future Directions

In habit research, retrospective self-reports of experience and frequency of behaviour are the most widely utilised measures of habit strength (Gardner et al., 2011). The Behavior-frequency-in-context (BFiC) measure combines measures of how frequent a behaviour is performed (performance frequency) with how stable the context in which the behaviour performed is (context stability) (Ji & Wood, 2007). The current measure of habit is based on the assumption that through the learning processes underlying habits, a behaviour that recurs in a stable context develops as a habitual response. Habitual behaviours are frequently performed in stable contexts, thus habit strength multiplicatively combines the frequency and context stability of behaviour (Wood & Neal, 2009). The current study utilised the BFiC measure to assess habitual coffee consumption. This method may be considered as both a strength and a limitation of the present research.

The BFiC measure has demonstrated high levels of predictive validity (Ji & Wood, 2007; Ouellette & Wood, 1998; Wood et al., 2005), partly deriving from the strong association between past and future behaviour (Labrecque & Wood, 2015). Additionally, the BFiC measure is context-sensitive and taps the cue dependence of habit. However, the BFiC measure has been criticised as it relies heavily on the past frequency of behaviour, and may therefore reflect other factors as well as habits that effect behaviour such as active goal

pursuit (Ajzen, 2002). For example, the feelings of ease and fluency associated with behaviours that are frequently performed which, in turn, elicit positive affect (e.g., I felt motivated after I consumed coffee; therefore, I must have intended to drink it) (Wood & Runger, 2016). Furthermore, the BFiC captures the conditions that facilitate habit-formation, instead of the automaticity in which behaviour is evoked.

In contrast, the Self Report Habit Index (SRHI) employed in the current study, is a self-report measure that assesses people’s perception of repeated behaviours directly, the automaticity of a response, and their identification with a behaviour (Verplanken & Orbell, 2003). The SRHI avoids the emergence of additional factors present in assessing the association between past and future behaviour by placing focus on automaticity instead of behavioural frequency. The main limitation of utilising this measure in the current research is that it required participants to report on automaticity, which may be resistant to conscious self-reflection by its very definition (Hagger et al., 2015). Participants in the current study may have felt unable to accurately judge whether coffee drinking was deliberative or automatic and struggled to recall past coffee drinking behaviour or environmental cues (e.g., “I do not recall drinking coffee, yet I felt energised; therefore, I must have drunk coffee automatically”) (Gardner & Tang, 2013). Instead of capturing the habit itself, a self-report was most likely a reflection of the self-inference about one’s coffee drinking habits based on the consequence of the repeated behaviour (Snihotta & Pesseau, 2012). The context-dependence of habits is not often isolated in the SRHI. The effects of other processes involved in automaticity may also have been captured by the current research findings (e.g., the feeling of fluency that arises from the automatic pursuit of goals) (Mazar & Wood, 2018). The convergence of self-report measures of habit with objective measures of automaticity requires more investigation.

The present findings contribute to the ongoing discussion that concerns operationalising habit in research. Measures included in the current research combines the cue dependence of the BFiC with the automaticity of the SRHI with specification of both a recent instance of behaviour (i.e., coffee consumption) along with the context in which it occurred. Relatedly, there is little evidence to support the argument that context-free measures of habit are better at estimating performance repetition in various contexts (Gardner & Lally, 2012). Due to the exclusion of contextual components, the context-free measure is likely to be less sensitive to particular cue-response patterns. The current research further enhances the content validity of the SRHI and the BFiC self-report habit measures by incorporating the Context-Specific Habit Measure. Context-specific behaviour was specified with the aim of further enhancing the conceptual clarity of applying measures of habit to research and to prevent the conflation of reflective and automatic processes (Gardner & Tang, 2013). Additional comparative research is required to identify the most sensitive and valid measure of context-specific automaticity.

The snapshot method employed in the current study may have inaccurately captured the inner states of participants as all data was collected at one point in time. When an internal state that is context-dependent and varies with time (e.g., mood, fatigue) is assessed, the interval between that experience and participants' responses (response latency), is particularly important. In the current study, experiences and events that occurred during recall which involves an active reconstruction process likely distorted past mood or internal states like fatigue (Gorin & Stone, 2001), therefore, responses may have significantly differed from those obtained in momentary conditions. Furthermore, as coffee consumption may be influenced by fatigue upon waking up, assessing the potential effect of fatigue upon waking up on coffee consumption may have been required to prevent biased attributions from arising with coinciding self-reports (e.g., "I must have been tired because I drank coffee this

morning”). Alternative measurements that investigate implicit cognitive associations in real-life contexts may offer more promising directions for future research in the study of habits (Mazar & Wood, 2018).

The validity of the Context-specific Habit measure and the Self-Attribution measure was not reported within the current study. As these are relatively novel measures, their validity has not yet been determined. However, to the researcher’s knowledge, these scales have been used in a recently published peer reviewed article (Mazar & Wood, 2022) and as such were considered appropriate scales to utilise in the current study.

Conclusion

There is consistent evidence that people often use internal states in their explanations of behaviour. Thus, they may discount the role of habits. The current research further substantiates the existing literature and strengthens previous findings. In this study, we assessed a potential bias that underestimates the influence of habit on behaviour in favour of internal states by investigating the relationship between people’s perception of a habitual behaviour, that is coffee consumption, with the actual predictors of that behaviour. Attributions made by participants placed a greater emphasis on fatigue than on habits, whereas habits demonstrated a stronger behavioural influence.

Future methodological developments, especially measures that precisely capture the automaticity of habits by distinguishing features of habit automaticity are likely to yield significant progress in the study of habits. In addition, studies that use alternative measures that investigate implicit cognitive associations in real-life contexts and longitudinal research to accurately assess experiences that are context-dependent and time-varying (e.g., mood, fatigue), have exciting potential for the measurement of habit.

The current snapshot study demonstrated a bias with habits in people’s daily experiences. When people discount the role of habits as demonstrated in this study, they lack

the ability to self-regulate habitual behaviour effectively. Overall, a major finding of the current research is as follows: habits demonstrate inconsistencies with the inferences people make about their behaviour. The current findings contribute to our understanding of habits which is crucial in terms of human health and wellbeing in practice. Various lifestyle habits such as insufficient exercise and poor diet are significant risk factors for chronic illnesses. By developing an understanding of the mechanisms underlying habits, interventions that modify unwanted habitual behaviours may help individuals to form habits that are more beneficial which allows them to achieve goals for productive, healthy lives.

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Appendices

Appendix A

Information Sheet

You are being invited to take part in a research study. Before deciding whether to take part, please take the time to read this document, which explains why the research is being done and what it would involve for you. If you have any questions about the information provided, please do not hesitate to contact me using the details at the end of this sheet.

What is this study about?

I am a final year student in the BA in Psychology programme at National College of Ireland. As part of our degree we must carry out an independent research project. This research project aims to understand **daily human experience**. Questions in this study will ask you about your coffee and soft drink consumption. This study is supervised by Dr. Brendan Cullen.

What will taking part in the study involve?

If you agree to take part in this study, you will be asked to complete 3 sections. Section 1 contains an intake survey. The intake survey takes about 2 minutes to complete. Section 2 contains a mini-survey. The mini-survey takes about 30 seconds to complete. Finally, you will complete a brief final survey in Section 3 of this study. The final survey takes ~2 minutes. Therefore, your total participation time should be approximately 5 minutes. You can track your survey completion by viewing the progress bar at the top of your screen. You will need access to both a device with internet connection to complete this study. You do not have to answer any questions you don't want to.

How do I take part in this study?

If you are participating in this study you should read the consent form and select 'agree' to participate. Email me if you have any questions about the study. After you select 'agree' at the bottom of the consent form, you can follow the instructions on your screen.

Who can take part?

You can take part in this study if you are aged over 18, speak fluent English, own a device with access to the internet and consume coffee once a day or more.

Do I have to take part? Can I withdraw?

No, you do not have to take part. Participation in this research is completely voluntary; you do not have to take part, and a decision not to take part will have no consequences for you. If you do decide to take part, you can withdraw from participation at any time without explanation, and without penalty by exiting the browser. Participants have the right to refuse to answer any question that they do not feel comfortable to answer.

What are the possible benefits of taking part?

There are no direct benefits to you for taking part in this research. However, the information gathered will contribute to research that helps us to understand daily human experience by analysing each individual participant's daily coffee consumption. The data collected aims to provide explanations for human behaviours in the adult population.

Will taking part be confidential and what will happen to my data?

The complete survey is anonymous, it is not possible to identify a participant based on their responses to the survey. All data collected for the study will be treated in the strictest confidence. Responses to the survey will be fully anonymised and stored securely in a password protected/encrypted file on the researcher's computer. Data will be retained and managed in accordance with the NCI data retention policy. Once participation has ended, you

will not be able to withdraw any data. Note that anonymised data may be archived on an online data repository, and may be used for secondary data analysis. If you do not want your data used for secondary analysis, you should not participate. If you have any concerns or queries in relation to data protection for this research project, you may contact the NCI data protection officer, Niamh Scannell (Niamh.Scannell@ncirl.ie).

What will happen to the results of the study?

The results of this study will be presented in my final dissertation, which will be submitted to National College of Ireland.

Who should you contact for further information?

If you have any questions or concerns about the research, please feel free to contact Sarah Tang (x20414344@student.ncirl.ie) or my supervisor Dr. Brendan Cullen (brendan.cullen@ncirl.ie).

Appendix B

Consent Form

In agreeing to participate in this research I understand the following:

- If I have any concerns about participation, I understand that I may refuse to participate or withdraw at any stage by exiting my browser.
- I understand that once my participation has ended, that I cannot withdraw my data as it will be fully anonymised.
- I have been informed as to the general nature of the study and agree voluntarily to participate.
- All data from the study will be treated confidentially. The data from all participants will be compiled, analysed, and submitted in a report to the Psychology Department in the School of Business.

- I understand that I will not benefit directly from participating in this research.
- I understand that my data will be retained and managed in accordance with the NCI data retention policy, and that my anonymised data may be archived on an online data repository and may be used for secondary data analysis. No participants data will be identifiable at any point.
- I understand that under freedom of information legalisation I am entitled to access the information I have provided at any time while it is in storage as specified above.
- At the conclusion of my participation, any questions or concerns I have will be fully addressed.

If you'd like to participate the study, please acknowledge that you viewed this form by selecting the "I agree" box below:

Appendix C

Section 1: Intake Survey

Thank you for participating in this study!

Some questions in this study will ask you about your coffee consumption. For your reference, here's a definition of "coffee". Please read this definition carefully.

Coffee: any drink brewed from coffee beans, including, for example, drip coffee, french press coffee, instant coffee, espresso-based drinks such as latte and cappuccino, cold drinks such as iced coffee, and Starbucks drinks such as frappuccino or pumpkin spice latte.

Please click 'next' to proceed.

Start of Block:

att According to the definition described earlier, to what category does iced coffee belong to?

- Coffee (1)
- Soft drink (2)
- Both a type of coffee and a type of soft drink (3)
- Neither (4)

Start of Block: Start of Block: BFCS

coffee.freq How often do you drink coffee?

- Less than once a week (1)
 - 1-2 times a week (2)
 - 3-5 times a week (3)
 - 6-7 times a week (4)
 - More than 7 times a week (that is, more than once a day) (5)
-

Page Break

coffee.freq.day Which one best describes your coffee drinking frequency?

- Once a day (1)
 - Twice a day (2)
 - 3 times a day or more (3)
-

Page Break

coffee.contx.time When you drink coffee, how often is it at the same time of day? For example, in the morning or before/after a certain class

- Never or almost never at the same time (1)
 - Rarely at the same time (2)
 - Sometimes at the same time (3)
 - Usually at the same time (4)
 - Almost always or always at the same time (5)
-

Page Break

coffee.contx.loc When you drink coffee, how often is it at the same location? For example, the same coffee shop, or at home.

- Never or almost never at the same location (1)
 - Rarely at the same location (2)
 - Sometimes at the same location (3)
 - Usually at the same location (4)
 - Almost always or always at the same location (5)
-

Start of Block: Start of Block: SRHI

srhi.1 Please rate your level of agreement with the following sentences:

Drinking coffee is something I do frequently

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Page Break

srhi.2 Drinking coffee is something I do automatically

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

srhi.3 Drinking coffee is something I do without having to consciously remember

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Page Break

srhi.4 Drinking coffee is something that belongs to my daily routine

- Strongly disagree (1)
 - Somewhat disagree (2)
 - Neither agree nor disagree (3)
 - Somewhat agree (4)
 - Strongly agree (5)
-

Page Break

srhi.5 Drinking coffee is something that I start doing before I realize I'm doing it

- Strongly disagree (1)
 - Somewhat disagree (2)
 - Neither agree nor disagree (3)
 - Somewhat agree (4)
 - Strongly agree (5)
-

Page Break

srhi.6 Drinking coffee is something that I would find hard not to do

- Strongly disagree (1)
 - Somewhat disagree (2)
 - Neither agree nor disagree (3)
 - Somewhat agree (4)
 - Strongly agree (5)
-

Page Break

srhi.7 Drinking coffee is something that I have no need to think about doing

- Strongly disagree (1)
 - Somewhat disagree (2)
 - Neither agree nor disagree (3)
 - Somewhat agree (4)
 - Strongly agree (5)
-

Page Break

srhi.8 Drinking coffee is something that I do without thinking

- Strongly disagree (1)
 - Somewhat disagree (2)
 - Neither agree nor disagree (3)
 - Somewhat agree (4)
 - Strongly agree (5)
-

Page Break

srhi.9 Drinking coffee is something that I have been doing for a long time

- Strongly disagree (1)
 - Somewhat disagree (2)
 - Neither agree nor disagree (3)
 - Somewhat agree (4)
 - Strongly agree (5)
-

Page Break

srhi.10 Drinking coffee is something that would require effort not to do it

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Page Break

End of Block: Start of Block: SRHI

Start of Block: Start of Block: TPB

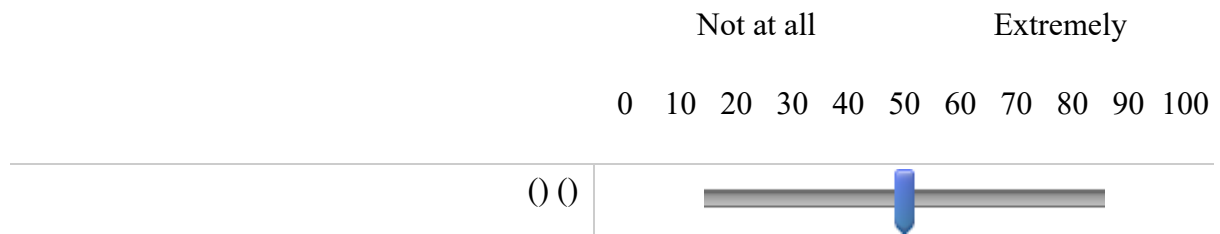
cof.int Please rate your agreement with the following statement:

I intend to drink coffee $\{e://Field/sd.freq\}$

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Page Break

cof.enj How much do you enjoy drinking coffee?

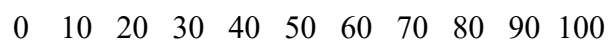



End of Block: Start of Block: TPB

Start of Block: Start of Block: Attribution

att Rate to what extent your coffee drinking is driven by the following factors, from 0-100%, where 0% means that your coffee drinking is not determined by that factor, and 100% means that your coffee drinking is completely determined by that factor.

Note that your total rating for the 2 factors combined should not exceed 100%. For example, if your rating for one factor was 50%, your rating for the other factor should fall between 0%-50%. In addition, the sum of both ratings does not have to add up to 100%, and therefore can be any percentage from 0% to 100%.



My past behavior and habits (1) ()	
My energy levels or tiredness (2) ()	

End of Block: Start of Block: Attribution

Appendix D

Section 2: A Snapshot of Daily Experience

Start of Block: COFFEE prompt

location Where are you right now?

- Home (1)
- Campus (2)
- Work (not on campus) (3)
- Outside (4)
- In transit (Car, Bus, Bike, etc.) (5)
- Friends/family place (6)
- Coffee shop (7)
- Restaurant (8)
- Other (9)

Page Break

coffee Did you drink coffee in the past 24 hours?

- No (1)
- Yes - 1 drink (2)
- Yes - 2 drinks (3)
- Yes - 3 drinks or more (4)

Page Break

fatig How tired were you when you last drank coffee?

	(1)	(2)	(3)	(4)	(5)	
	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	
Not at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Extremely

Page Break

mood What was your mood when you last drank coffee?

	(1)	(2)	(3)	(4)	(5)	
	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	
Unhappy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Happy

Page Break

situ.drink Please describe briefly (in up to 5 words) in what situation you most recently drank coffee (for example, "right before going to the gym", "with friends")

End of Block: COFFEE prompt

Appendix E

Section 3: Final Survey

The following section of the survey takes up to 2 minutes to complete. Please make sure that you are in a situation where you will not be disturbed. When you are ready to proceed, click on the arrow below.

End of Block: Instructions

Start of Block: Event 1

srbai.1 Answer about the following situation: $\{e://Field/Q7A\}$

In this situation, getting (or making) coffee is something that I would have to think about.

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Page Break

bfc.1 Answer about the following situation: $\{e://Field/Q7A\}$

How often do you get (or make) coffee in this situation?

- 0%-20% of the times when I'm in that situation (1)
 - 20%-40% of the times when I'm in that situation (2)
 - 40%-60% of the times when I'm in that situation (3)
 - 60%-80% of the times when I'm in that situation (4)
 - 80%-100% of the times when I'm in that situation (5)
-

Page Break

intent.1 Answer about the following situation: $\{e://Field/Q7A\}$

I intend to get (or make) coffee in this situation.

- Strongly disagree (1)
 - Somewhat disagree (2)
 - Neither agree nor disagree (3)
 - Somewhat agree (4)
 - Strongly agree (5)
-

Page Break

sit.freq.1 Answer about the following situation: $\{e://Field/Q7A\}$

How often are you in this situation?

- Less than once a week (1)
- 1-2 times a week (2)
- 3-5 times a week (3)
- 6-7 times a week (4)
- More than 7 times a week (that is, more than once a day) (5)

End of Block: Event 1



Start of Block: Specific attributions

att You reported drinking coffee in the following situation: $\{e://Field/Q7A\}$

Rate to what extent your **coffee drinking in that specific situation** was driven by the following factors, from 0-100%, where 0% means that your coffee drinking is not determined by that factor, and 100% means that your coffee drinking is **completely** determined by that factor.

Note that your total rating for the 2 factors combined should not exceed 100%. For example, if your rating for one factor was 50%, your rating for the other factor should fall between 0%-50%. In addition, the sum of both ratings does not have to add up to 100%, and therefore can be any percentage from 0% to 100%. Try to be as accurate as possible!

0 10 20 30 40 50 60 70 80 90 100

My energy levels or tiredness at the time (1) ()	
My past behavior or habits (2) ()	

Page Break

recall Do you remember this specific situation in which you drank coffee: $\{e://Field/Q7A\}$

- Yes (1)
- No (2)
- Not sure (3)

End of Block: Specific attributions

Start of Block: Self-regulation

self.reg Select which one of the following statements best describes you:

I drink coffee...

- More often than I would like (1)
- As much as I would like (2)
- Less often than I would like (3)

End of Block: Self-regulation

Start of Block: Demographics

age Please provide the following details about yourself:

Age (in numbers, for example "21"):

Page Break

gender.cur What gender do you currently identify with?

- Male (1)
 - Female (2)
 - Other (3)
-

Page Break

End of Block: Demographics

Appendix F

Debriefing Form

Thank you very much for agreeing to participate in this research. Human behaviour is very complex, and we need the help of people like you to help explain it. Your active participation has helped us gain insight into people's explanations and experiences as they emerge naturally in everyday life.

Habits are mental associations that people develop when they repeatedly perform rewarding behaviours in a specific context (Knowlton & Diedrichsen, 2018). The purpose of this study is to explain the causes of repetitive day-to-day behaviours such as drinking coffee by assessing fatigue and coffee consumption over the past 24 hours. I will assess strength of habits and attributions to individual consumption of coffee. This research aims to address the correlation between the perceived and real causes of behaviour. If you have any follow-up questions or are interested in knowing the results of the study (once it is complete), please contact me @x20414344@student.ncirl.ie so that I can share that information with you.

The complete survey is anonymous, it is not possible to identify a participant based on their responses to the survey. All data collected for the study will be treated in the strictest confidence. Responses to the survey will be fully anonymised and stored securely in a password protected/encrypted file on the researcher's computer. Data will be retained and managed in accordance with the NCI data retention policy. Once participation has ended, you will not be able to withdraw any data. Note that anonymised data may be archived on an online data repository, and may be used for secondary data analysis. If you have any concerns

or queries in relation to data protection for this research project, you may contact the NCI data protection officer, Niamh Scannell (Niamh.Scannell@ncirl.ie).

In the case a participant becomes uncomfortable at any point during the study you have the right to withdraw and refer to the contact details at the end of this debrief form of relevant supports and helplines. Contact details of the researcher and supervisor will also be provided if further information and clarification is needed by the participant.

Researcher Contact Information: x20414344@student.ncirl.ie

Supervisor Contact Information: brendan.cullen@ncirl.ie

Support

Samaritans: 116 123

Aware: 1800 80 48 48

Submission of Thesis and Dissertation**National College of Ireland Research Students Declaration Form***(Thesis/Author Declaration Form)***Name: Sarah Tang****Student Number: 20414344****Degree for which thesis is submitted: Bachelor of Arts (Hons) Psychology****Title of Thesis: Underestimating Habits: Explanations of Habitual Behaviour in the Adult Population****Date: 12/03/2023****Material submitted for award**

A. I declare that this work submitted has been composed by myself.

B. I declare that all verbatim extracts contained in the thesis have been distinguished by quotation marks and the sources of information specifically acknowledged.

C. I agree to my thesis being deposited in the NCI Library online open access repository NORMA.

D. Either *I declare that no material contained in the thesis has been used in any other submission for an academic award.

Or *I declare that the following material contained in the thesis formed part of a submission for the award of

I declare that the following material contained in the thesis formed part of a submission for the award of QQI BA (Honours) Degree in Psychology at level 8

(State the award and the awarding body and list the material below)

