

Habits: Formation and Change

Alan Peter Lau

Department of Electrical and Computer Engineering

University of Auckland

alau645

2714269

ABSTRACT

Many diseases and mental illnesses arise in life due to having bad habits and an unhealthy lifestyle. In order to obtain a happy and healthy life, it is suggested that having good daily habits is crucial to achieving such a life. This report investigates what a habit is, what defines a habit as good or bad, how habits are formed, strengthened, broken and changed. This knowledge will be incorporated into a daily habits calendar/diary application which can then inform and educate users of examples of good and bad habits and their effects. This will allow them to form, strengthen good habits and to break and change bad habits through the use of this application, which provides users the ability to record their daily habits or routine as an incentive to form daily habits and strengthen them. Overall, this will help users achieve a happy and healthy life.

INTRODUCTION

Good daily habits is key to obtaining a happy and healthy life, as they come with many short- and long-term health benefits. Common problems that individuals experience today is having bad daily habits and not fully understanding the immediate and future consequences of performing such bad habits. It is difficult to break habits and even more so if they are bad habits [3].

Our project involves designing and developing a calendar/diary application which will allow users to self-record their habits or behaviours. For example, users can set goals such as 30 minutes of walking by end of today, which is categorised as an exercising habit. By exploring what are some good and bad habits and how they affect one's health and happiness in life, a better understanding can be gained and this knowledge can be stored into a database format and integrated with the calendar/diary application which can inform, guide and motivate individuals to dispose of bad habits and develop good habits. The main objective of our calendar/diary application is to give users a method of achieving a happier and healthy life by providing them with a solution and assist them with forming and strengthening good habits and a guide to breaking and changing their bad habits.

This report will outline basic concepts, such as the definition of a habit, good and bad habits, how habits are formed, strengthened, broken and changed. Further research is done, using databases such as Google Scholar, Scopus and EBSCO Host, to determining examples of good and

bad habits and their effects. Finally, it is discussed how this report is relevant to our project.

CONCEPTS

What is a 'habit'?

The term 'habit' is abstract and socially-defined meaning that there is not a definitive way to 'correctly' define it, as it is a very subjective in nature [3]. The definition of 'habit' as "behavioural patterns, based on learned context-behaviour associations, that are elicited automatically upon encountering associated contexts ... acquired through context-dependent repetition" [6] best suits the context of this report. This simply means that 'habits' are a type of behaviour that is obtained by consistent repetition of this behaviour and it is automatically shown when the required circumstances and environment are present. For example, when an individual wishes to go up two floors in a building and is presented with a flight of staircases and an elevator, he instinctively chooses to take the stairs because it is his habit to take the stairs over an elevator.

When is a Habit classified as 'Good'?

When a habit provides both overall short- and long-term benefits to an individual's psychological well-being and personal health it can be classified as a 'good' habit. Having good daily habits will improve one's happiness and health in life.

Some examples of good daily habits include:

- Eating breakfast routinely
- Having a healthy diet
- Having a good quality and duration of sleep
- Getting higher levels of exercise
- Saving and engaging in future-orientated financial activities

When is a Habit classified as 'Bad'?

When a habit causes overall consistent short-term and/or overall long-term detrimental effects to an individual's psychological well-being and personal health it can be classified as a 'bad' habit. Some bad habits may provide short-term benefits such as smoking which improves the smoker's mood temporarily and social image. Having bad

daily habits produces an overall adverse effect to one's happiness and health in life.

Some examples of bad daily habits include:

- Skipping breakfast
- Having an unhealthy diet
- Having bad quality and duration of sleep
- Low levels of exercise
- Sedentary lifestyle
- Smoking

APPROACHES

This section explains methods of how habits can be formed, strengthened and how bad habits can be broken and changed.

Habit Formation

There are three distinct stages in the formation of a (new) habit: declarative, knowledge compilation and procedural stages [3].

The first stage is the declarative stage which involves cognitive processing of information relating to the behaviour and storing it into their working memory [3]. For example, people can watch an advertisement of Coca-Cola and this will be stored into their working memory, which causes them to consider buying Coca-Cola in their next supermarket shopping session. Attitudes and social desirability play an important part of initiating formation of habits [3]. People would consider the price, taste, and social image of consuming Coca-Cola.

Knowledge compilation is the second stage which is where the habit is in the process of being formed and the effort of cognitive thinking is mostly reduced [3]. In the Coca-Cola case, this would mean people would think less about price, taste and social image and just purchase it.

The final stage is the procedural stage where the habit is fully formed [3]. With the Coca-Cola example, at this stage people would buy it instinctively, that is, with minimal or zero conscious awareness.

Strengthening Habits

Habits can be strengthened through positive reinforcement (which also assists in the formation of habits) [3]. This positive reinforcement occurs when there is immediate positive outcomes after the habit is performed [3]. This causes an increased motivation to repeat the behaviour of the habit [3]. For instance, one may enjoy consuming Coca-Cola and the immediate, short-term enjoyment of consuming Coca-Cola could potentially be enough for this habit to strengthen and continue to be performed routinely.

The outcomes of performing behaviours relate to how it satisfies our fundamental human needs [3]. According to Max-Neef, there are nine classifications of fundamental human needs: subsistence, protection, affection, understanding, participation, leisure, creation, identity and freedom [3]. The outcomes of habits can satisfy one, multiple, and even compromise one need for another [3]. For instance, consuming Coca-Cola can provide for calorie intake (need for subsistence), but consistently consuming Coca-Cola is detrimental to one's health which increases the risk of diabetes and obesity.

Eventually, habits become so strong that information regarding its negative effects are easily dismissed [3]. For example, a regular Coca-Cola consumer may know and understand that drinking it can potentially result in the degradation of their teeth and their personal health by increasing their risk for diabetes and obesity, however the immediate positive outcome that satisfies their short-term need is not sufficient to prevent them from consuming Coca-Cola.

At this stage, these 'bad' habits with negative short- and long-term consequences can be defined as an addiction [3], where even if one becomes aware of new information regarding long-term negative consequences, it will not affect the performance of their 'bad' habit as their short-term cyclical-needs continues to be dominant and heavily outweighs those negative consequences from their perspective [3]. A good example would be smokers – although most smokers are informed with the fact that smoking causes long-term detrimental effects to their health, they still continue to smoke. If they attempt to quit smoking they will still experience a craving for a cigarette, which is a sign of an addiction.

Breaking and Changing Habits

A reason to quit a habit is when the social or physical environment changes [3]. For example, smoking could hypothetically be socially viewed as 'uncool' by the majority of society so one may want to quit smoking due to social desirability. One day in the future, stairs might become obsolete and buildings are designed without stairs and only with elevators. People who have the habit of taking the stairs will be forced to quit this habit because it is now impossible to perform this habit.

The main reason to quit a 'bad' habit is because of the negative consequences associated with performing it [3]. The first step to quitting a 'bad' habit is being informed about its negative consequences and then having the will and motivation to change [3]. Organisations spend a great deal of time and money running informational campaigns informing and educating adolescents about the negative consequences of unprotected sexual intercourse, for instance. Studies have shown that providing very visible information about the negative consequences during the moment the bad habit is performed, causes a strong

behavioural change [3]. For example, the warning labels on cigarette packaging showing graphic information causes a reduction in the number of cigarettes people smoke [3]. In another study where university students were at the situation where they can either take the stairs or take the elevator, they were provided with the information that taking the stairs is healthy during the moment of the behaviour being performed. This resulted in a large number of students changing their behaviour (even if it was temporary) and ended up taking the stairs [3].

More successful informational campaigns focus on the both negative consequences of the bad behaviour and the positive outcomes of an alternative, good behaviour in order to encourage it [3]. For example, riding a bicycle as opposed to driving a car to get to work. This results in health benefits due to exercising routinely and a reduction in their ecological footprint.

Overall, breaking and changing a habit is most effective when it satisfies these three criterias [3]:

1. The social or physical environmental changes block the habit making it impossible for the habit to be performed [3]. Furthermore, the positive short-term outcomes should be eliminated and swapped out for negative short-term outcomes to make the performance of the habit less appealing [3].
2. Information regarding the negative consequences of bad habits and/or positive consequences of good habits should be made available, which is found to be most effective at the moment the habit is being performed [3].
3. Information regarding an alternative good behaviour and its positive consequences should be made available, which increases the chances of forming a good habit [3].

FINDINGS

This section discusses examples of good and bad habits and their consequences from a review of literature. This information can be directly incorporated into our calendar/diary application in database format, where users can access it. This is to be a good guide to identifying good and bad habits and will help motivate users form good habits and initiate the first step in breaking bad habits by being informed of its negative long-term consequences.

Examples of Good Daily Habits and their Consequences

Eating breakfast routinely

Routinely eating breakfast helps in maintaining weight, greatly reduces the risk of obesity and improves health-related quality of life (QOL) such as general health perceptions, vitality, social functioning and mental health [4].

Having a healthy diet

A healthy dietary pattern consisted of “vegetables, salads, fruits, rice, pasta, cereals, fish, wine, and non-processed

meats” [5]. Keeping to a healthy diet has shown to reduce the risk of common mental disorders such as depression and anxiety [5]. Depression is currently a very common illness which negatively impacts one’s daily life, for example, insomnia, bad eating habits, lack of energy and motivation, and suicidal thinking [5].

Having a good quality and duration of sleep

For children and adolescents, getting sufficient and quality sleep is a common problem in today’s society. Improving sleep quality and duration can reduce daytime sleepiness, resulting in better school performance and many other health benefits [2].

Getting higher levels of exercise

Higher levels of exercising leads to better quality of sleep, in turn resulting in better quality of life, including attributes such as low daytime tiredness, high daytime concentration, better mood, less depressive symptoms, less stress, greater self-confidence, and better attitude towards life [1].

Saving and engaging in future-orientated financial activities

Engaging in such activities can result in immediate beneficial psychological effects, financial happiness, personal health and overall happier lives [8]. Also, future-orientated behaviours such as learning and understanding financial management as well as the act of saving, results in immediate psychological benefits [8].

Examples of Bad Daily Habits and their Consequences

Skipping breakfast

Skipping breakfast increases the risk of developing obesity in adults. Other negative health effects of breakfast skipping includes insomnia, increased blood pressure, and can induce health-degrading behaviours, for instance, smoking, alcohol and inadequate exercise [4]. Also, results from the survey show that breakfast skippers have considerably lower health-related QOL than breakfast eaters [4].

Having an unhealthy diet

A western (unhealthy) dietary pattern consisted of “foods including meat and liver, processed meats, pizza, salty snacks, chocolates, sugar and sweets, soft drinks, margarine, mayonnaise, French fries, beer, coffee, cake, and ice cream” [5]. An unhealthy diet has shown to increase anxiety in both men and women [5].

Having bad quality and duration of sleep

Bad quality and insufficient duration of sleep causes daytime sleepiness and which negatively impacts on school performance [2].

Low levels of exercise

Low levels of exercise increases risk of poor sleep and psychological functioning [1].

Sedentary lifestyle

Such a lifestyle results in poorer mood and unpleasant feelings such as “distress, anger, disgust, fear and shame”, with an increased risk of developing mental illnesses [7].

Smoking

Smoking is widely known to cause lung disease, cancer, and many other health-risks and illnesses [3].

RELATION TO PROJECT

Understanding what is a habit, what determines it as either ‘good’ or ‘bad’, the formation of habits, strengthening of habits, breaking and changing of habits, and the knowledge of some common good and bad daily habits all make up the framework that is essential for designing and developing our daily habits calendar/diary interface to be successful at forming and strengthening a user’s good habits and breaking and changing their bad habits into good habits.

Habits will be formed by the daily use of our daily habits calendar/diary application which is used to self-record their habits and behaviours. To strengthen the habit and make it into a daily habit, users have the option to make data entry available for only today's data, such that yesterday's and tomorrow's data is made uneditable. Our application can also display information to inform and educate users of the short- and long-term benefits of some good daily habits, as well as the negative consequences of some bad daily habits.

The first step to breaking bad habits is being aware of the long-term negative consequences and then having the will and motivation to break that bad habit. As explained above, our application will have the ability to display information regarding the negative consequences of some bad daily habits which users can read.

The main objective of our calendar/diary application is to give users a method of achieving a happier and healthy life by providing them with a solution to forming and strengthening good habits and a guide to breaking and changing their bad habits.

SUMMARY

A ‘habit’ in this report’s context is a type of behaviour that is obtained by consistent repetition and it is automatically performed when the required circumstances and environment are present. For instance, if a can of Coca-Cola is given to someone who drinks Coca-Cola on a daily-basis (habit), this person is inclined to drink it without much cognitive input and this behaviour is performed almost automatically and instinctively.

Habits that provide both overall short- and long-term benefits to an individual’s psychological well-being and personal health can be classified as a ‘good’ habit, for example, high levels of exercise and eating breakfast routinely. In contrast, habits that cause overall consistent short-term and/or overall long-term detrimental effects to an individual’s psychological well-being and personal

health can be classified as a ‘bad’ habit, for example, skipping breakfast and having a poor quality and duration of sleep.

Habit formation consists of three distinct stages: declarative, knowledge compilation and procedural stages. Habits can be strengthened using positive reinforcement, that is, an immediate positive outcome is produced after the habit is performed. Habits can potentially be broken and/or changed when the social or physical environment changes, and/or when the long-term negative consequences become known to the user.

Understanding all these concepts and incorporating it into the design and development of our calendar/diary application is vital for it to be successful at forming and strengthening a user’s good habits and breaking and changing their bad habits into good habits.

LIMITATIONS AND FUTURE WORK

There are many other good and bad daily habits that have not been covered in this report. Therefore, more research is required in order to create an extensive database of good and bad habits which will be of great use to our calendar/diary application users. This report mainly focused on researching physical habits, such as eating, exercising and sleeping, which have a more physical impact on the body rather than mental effects. More research can be conducted on habits that focus on mental effects, such as studying, meditation and listening to music.

Furthermore, more research is needed to be conducted on finding the best possible solutions in helping users form specific good habits. In this report, examples of good and bad habits and their effects were identified, but minimal information regarding how to specifically form these habits was presented. However, the framework of habit formation, habit strengthening, habit breaking and changing was discussed and this framework can be applied to these examples of habits. This will require further work.

Integrating this information into our diary/calendar application and how it will be displayed to users is the next step in our project. In this step of the project we will have to design how it will be stored in our application as a database and how users can access this database. The effectiveness of it will need to be measured and evaluated, and then with feedback obtained further design improvements can be made and tested again.

REFERENCES

1. Brand, S., Gerber, M., Beck, J., Hatzinger, M., Pühse, U. and Holsboer-Trachsler, E. High Exercise Levels Are Related to Favorable Sleep Patterns and Psychological Functioning in Adolescents: A Comparison of Athletes and Controls. *Journal of Adolescent Health* 46, 2 (2010), 133-141.
<http://www.sciencedirect.com.ezproxy.auckland.ac.nz/science/article/pii/S1054139X09002559>

2. Dewald, J., Meijer, A., Oort, F., Kerkhof, G. and Bögels, S. The influence of sleep quality, sleep duration and sleepiness on school performance in children and adolescents: A meta-analytic review. *Sleep Medicine Reviews* 14, 3 (2010), 179-189.
<http://www.sciencedirect.com.ezproxy.auckland.ac.nz/science/article/pii/S1087079209001002>
3. Gardner, B. A review and analysis of the use of 'habit' in understanding, predicting and influencing health-related behaviour. *Health Psychology Review*, (2014), 1-19.
<http://www.tandfonline.com.ezproxy.auckland.ac.nz/doi/full/10.1080/17437199.2013.876238#cit0020>
4. Huang, C., Hu, H., Fan, Y., Liao, Y. and Tsai, P. Associations of breakfast skipping with obesity and health-related quality of life: evidence from a national survey in Taiwan. *Int J Obes Relat Metab Disord* 34, 4 (2010), 720-725.
<http://www.nature.com.ezproxy.auckland.ac.nz/ijournal/v34/n4/abs/ijo2009285a.html>
5. Jacka, F., Mykletun, A., Berk, M., Bjelland, I. and Tell, G. The Association Between Habitual Diet Quality and the Common Mental Disorders in Community-Dwelling Adults. *Psychosomatic Medicine* 73, 6 (2011), 483-490.
<http://www.ncbi.nlm.nih.gov.ezproxy.auckland.ac.nz/pubmed/21715296>
6. Jager, Wander. "Breaking bad habits: a dynamical perspective on habit formation and change." *Human Decision-Making and Environmental Perception—Understanding and Assisting Human Decision-Making in Real Life Settings. Liber Amicorum for Charles Vlek, Groningen: University of Groningen* (2003).
http://www.rug.nl/staff/w.jager/jager_habits_chapter_2003.pdf
7. Pasco, J., Jacka, F., Williams, L., Brennan, S., Leslie, E. and Berk, M. Don't worry, be active: positive affect and habitual physical activity. *Aust NZ J Psychiatry* 45, 12 (2011), 1047-1052. <http://www.ncbi.nlm.nih.gov.ezproxy.auckland.ac.nz/pubmed/22059484>
8. Shim, S., Serido, J. and Tang, C. The ant and the grasshopper revisited: The present psychological benefits of saving and future oriented financial behaviors. *Journal of Economic Psychology* 33, 1 (2012), 155-165.
<http://www.sciencedirect.com.ezproxy.auckland.ac.nz/science/article/pii/S0167487011001231>