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Please refer to and cite the published copy available at

<https://www.taylorfrancis.com/books/9780429462795/chapters/10.4324/9780429462795-23>

eBook ISBN9780429462795

<https://doi.org/10.4324/9780429462795-23>

Chapter 18

(Part 4)

Applying Behaviour Change Methods to Food Waste

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Abstract

Similar to all human behaviours, food management behaviours are very complex with many external and internal influences. Knowledge of these influences is critical to develop effective interventions to minimise household food waste. This chapter explains two psycho-social models that can help understand householders' wasteful food behaviours, and guide interventions to promote more desirable food behaviours - The Motivation, Ability and Opportunity Model (MOA) and the Transtheoretical Model (TTM). The MOA identifies people's limitations to perform more desirable behaviours. It explains that behaviours are only performed when they are in the households' self-interest, and if people have the abilities and opportunities to perform them. The TTM is based on several psychological behaviour change theories and identifies where people sit in various "stages of change" (from not contemplating any change, to achieving a change and performing a new desirable behaviour). The TTM can also identify what people see as the costs and benefits of making a behaviour change, as well as explaining several psych-social processes that need to be operating for a change to occur.

Changing food waste preventing behaviours

All human behaviour is complex and this includes behaviours related to food waste where a diversity of factors have been related to household food wasting behaviours (Quested *et al.*, 2013; Parizeau, von Massow and Martin, 2015; Thyberg and Tonjes, 2016). Consequently, it is unlikely that any one theory or model could fully explore, explain or predict household food waste. However, models such as the Motivation Abilities and Opportunities (MOA) framework and the Transtheoretical Model of Behaviour Change (TTM), which are introduced in this chapter, have important roles to play. Further, the models can also provide frameworks for the development of interventions to change wasteful food behaviours. Each model is introduced

and its application illustrated in the context of food waste, with overall conclusions for both models' contributions finishing the chapter.

Motivation Abilities and Opportunities Framework

According to the Motivation, Abilities and Opportunities (MOA) framework, people perform desirable behaviours when these are in their self-interest and can be performed easily and effectively (Olander and Thøgersen, 1995; Rothschild, 1999). If the behaviours are not in their self-interest or if these are too difficult to be performed, people are resistant or simply unable to perform them voluntarily. In the MOA framework, factors influencing self-interest are referred to as motivation, and factors influencing the easiness and effectiveness of the behaviours are referred to as opportunities and abilities (see figure 1). This division of the multitude of factors into the three parts successfully guides intervention selection, as different interventions are likely to be required for the different MOA defined parts. This section discusses factors influencing food waste reduction and intervention selection, from the perspective of the MOA framework.

<FIGURE 18.1 HERE>

Figure 18.1 MOA Framework

Motivation

Motivation refers to a person's self-interest in performing a behaviour voluntarily. People are considered to be goal-driven, implying that behaviours are in their self-interest when these contribute to goal fulfilment. Setting a goal to reduce waste levels is determined by a person's awareness about the consequences of - and attitudes towards - wasting food as well as the social norms surrounding in-home food waste reduction.

To consider setting a goal to reduce food waste levels, people need to be aware that food waste has negative consequences. Most people indeed believe that food waste is negative for the environment and food distribution (Eurobarometer, 2014; Secondi, Principato, and Laureti, 2015), but underestimate the actual scope of the issue and the impact of its consequences (Principato, Secondi and Pratesi, 2015; Fox *et al.*, 2018). Also, they are likely to underestimate how much they waste themselves (Abeliotis, Lasaridi and Chroni, 2014). As a result, reducing food waste levels is often not considered relevant enough to be a goal to strive for.

It is not only awareness of the behavioural consequences which influences goal-setting, but also the importance given to these consequences. The importance given to an issue is reflected in people's attitude, that is, their thoughts and feelings towards wasting food. Research consistently finds that people have strong negative thoughts and feelings towards wasting food (Stefan *et al.*, 2013; Stancu, Haugaard and Lähteenmäki, 2016; Roodhuyzen *et al.*, 2017). They consider it to be morally wrong and this makes them feel guilty. However, this is often a reflection of people's attitude towards global food waste or their own food waste on an abstract level. When discussing their food waste levels in a more practical and day-to-day like manner, people usually respond nuanced or more neutral towards the issue (Van Geffen, Van Herpen and Van Trijp, 2016), and appear to trivialize their day-to-day food waste. This neutral attitude seems to stem from the feeling that the dynamics of life makes food waste inevitable wherefore it is needless to feel guilty each time food is wasted.

Behaviour is further known to be strongly influenced by social norms (Cialdini, Kallgren and Reno, 1991). Therefore, it is unsurprising that social norm beliefs also influence people's motivation to reduce their waste levels. More precisely, people's beliefs of how others who are important to them think about food waste, do not convincingly influence household

management behaviours (Stefan *et al.*, 2013; Visschers, Wickli and Siegrist, 2016) or waste levels (Van Geffen, Van Herpen and Van Trijp, 2017), but can influence setting an intention to reduce waste (Graham-Rowe, Jessop and Sparks, 2014; Stancu, Haugaard and Lahteenmaki, 2016; Russell *et al.*, 2017). However, peoples' beliefs if others important to them waste very little or no food, can strongly influence their behaviour, such that they want to equal the behaviours of these others (Van Geffen, Van Herpen and Van Trijp, 2017).

Often overlooked in current food waste literature, is the influence of other goals on the motivation to reduce waste levels. People have multiple valued goals they aim to act upon when handling food. These goals include ensuring consumption of safe foods (Watson and Meah, 2012), and achieving efficiency in preparation (Evans, 2012). Therefore, in order to set a goal to reduce waste levels, people should not only find food waste reduction important, but also more important than these other goals. Yet, food waste reduction, in contrast to some of the other goals, has few direct personal benefits, while people are known to act most easily on goals that have such benefits (Steg *et al.*, 2014). Food waste reduction is considered important due to its financial consequences and impact on the environment, but food prices are relatively low and the environmental impact is distant. In contrast, some of the other goals have personal and direct benefits, such as ensuring health, pleasure or saving time. These other goals are therefore more easily acted upon than waste reduction. This can steer towards waste generation, surely in cases of goals conflict (Nielsen, 2017), for instance when distasteful food is left and people need to decide if they will eat it to reduce waste or discard it to ensure food enjoyment. To circumvent such situations, it is beneficial if people are able to handle their food such that they can reduce waste while also acting upon important other goals.

Abilities

The MOA framework states that motivation to perform certain behaviours is not sufficient to actually perform them (Olander and Thøgersen, 1995; Rothschild, 1999). Rather, the right skills and knowledge sets are required to ensure that the behaviours can be performed effectively and easily. Research on objective abilities has shown that people often have incorrect knowledge on date-labels (Quested *et al.*, 2011) and suboptimal storage knowledge (Plumb and Downing, 2013; Aschemann-Witzel *et al.*, 2015), which increases the likelihood to waste as it shortens the time that foods will be eaten. Other research lines have examined subjective abilities, that is, people's belief that they are able to effectively perform certain household management practices. Results have shown that subjective abilities influence behaviour and actual waste levels (Stefan *et al.*, 2013; Van Geffen, Van Herpen and Van Trijp, 2017). These subjective abilities include people's ability to plan accurately, to prolong products' shelf-life, to store foods safely and to cook (tasty) dishes with left overs.

Opportunities

The MOA framework further states that next to motivation and abilities, opportunities need to be present in order for the behaviours to be performed. People only have so much time, energy and money to allocate in their daily life and opportunities influence how much of these resources need to be used in order to effectively reduce waste levels. If the performance of the desired behaviours are (perceived as) impossible or at the least inconvenient then they are unlikely to be performed. In terms of food waste, the opportunities refer to several aspects of the food handling process, namely fluctuations in daily schedules (e.g., amount of people joining for dinner, unexpected work or social appointments), food supply availability, (super)markets accessibility and equipment at home (Van Geffen, Van Herpen and Van Trijp, 2017). In cases of highly dynamic lives and fluctuating daily schedules, the amount of time and energy needed to correctly adjust the food handling behaviours (e.g., the planning) increases.

The availability of the products in the stores determines how easily the right packaging sizes and quality can be bought to avoid spoilage and the amount of money required for it. The accessibility of stores determines the amount of time needed to shop for food, and the amount of equipment at home how easily this food can be stored. Interestingly, the direction of the influences of these latter two opportunities is not yet clear; shops that are located closer to the home (thus requiring less time to visit and higher visit frequency), and more storage space at home, can be linked to more accurate planning and better storage practices in terms of shelf-life, but also to a lack of planning or over-purchasing and stocking up products. In any case, opportunities determine how easily people can reduce food waste levels while also acting upon their other valued goals. The better the opportunities, the more likely people will perform food waste reducing behaviours.

Interactions

The MOA framework is a social marketing tool, particularly intended for practical application in terms of intervention selection. Nevertheless, several theoretical investigations have taken place. These predominately investigated if and how the MOA parts interact (Binney, Hall and Shaw, 2003; Brug, 2008; Siemsen, Roth and Balasubramanian, 2008). So far, there is no clear consensus on this (Brug et al., 2008). Some suggest that abilities and opportunities are moderators between motivation and behaviour (Binney, Hall and Shaw, 2003) others that there is a bottleneck structure, meaning that it is the constraining factor among the three of motivation, ability and opportunity which determines behaviour (Siemsen, Roth and Balasubramanian, 2008). Regardless, the MOA framework has proven suited for intervention selection. It states that the that motivation, abilities and opportunities can be either present or absent (to a more or lesser extent), and so implies that there are eight different segment possibilities (i.e., combinations of motivation present/absent, abilities present/absent and

opportunities present/absent) (Binney, Hall and Shaw, 2003). For each segment a different combination of intervention is most suited. The interventions corresponding to each MOA part will be discussed in turn.

Interventions based on the MOA framework

Motivation, abilities and opportunities determine if people are prone, unable or resistant to perform food waste reducing behaviours (MacInnis *et al.*, 1991; Binney, Hall and Shaw, 2003). The MOA framework suggests that different classes of social interventions should be used in each case. When motivation, abilities and opportunities are present, reminders in the form of informational campaigns may be enough to encourage people to continue performing the behaviours. Yet, when (at least) one of the three aspects is lacking, other types of interventions are more promising.

When motivation is absent, changes in the regulatory environment (law and regulations) can encourage people to reduce their waste levels. Changing the costs and benefits of food waste related behaviours can strengthen the importance given to waste reduction, also in relation to other valued goals. For example, high waste levels can be discouraged by introducing (monetary) penalties (Jereme *et al.*, 2018) and low waste levels can be encouraged by subsidizing, providing special privileges or praise (Reisch, Eberle and Lorek, 2013). Alternatively, one can make changes in the choice structure of people to make behaviours that will reduce waste levels most likely to be performed, without eliminating choice options (von Kameke and Fischer, 2018). These nudges can gently steer people towards food waste reducing behaviours so that motivation does not need to be present to still perform the behaviours. Regulatory interventions or nudges are promising techniques to overcome lacking motivation to reduce waste levels (Reisch, Eberle and Lorek, 2013; Reisch and Zhao, 2017). Yet, a

downside is that the interventions improve externally and not the internally regulated motivation (Steg *et al.*, 2014) and consequently, people are likely to fall back in their old behaviour as soon as the interventions are dropped.

When motivation to reduce waste levels is present, but not easily prioritized over other goals, interventions that reinforce people's motivation seem best suited. These include interventions such as prompts, affective campaign appeals (Peter and Honea, 2012), social influences (Osbaldiston and Schott, 2012), competition (Abrahamse and Matthies, 2012) or commitment (Abrahamse and Matthies, 2012; Stöckli, Niklaus and Dorn, 2018). These type of interventions have in common that they do not necessarily change people's beliefs concerning food waste (Whitehair, Shanklin and Brannon, 2013) and consequently will only be successful for people who already intent to reduce their waste levels (Peter and Honea, 2012; Wonneberger, 2018).

In case abilities are lacking, people can best be helped by interventions that improve their food handling. One can think of educational campaigns to teach efficient food handling skills and improve knowledge (Schmidt, 2016; Romani *et al.*, 2018; Terpstra *et al.*, 2005; Dyen and Sirieix, 2016). Providing instructions have shown to be successful when used in isolation (Romani *et al.*, 2018), but more effective when used in combination with other interventions, such as commitment and prompts (Osbaldiston and Schott, 2012; Schmidt, 2016). Additionally, interventions can provide feedback on the level of food wasted and/or efficiency of certain food handling behaviours (e.g., planning). This feedback can subsequently be used to improve food handling behaviours. General pro-environmental literature has shown that feedback seems to be most effective for people who are already motivated (McKenzie-Mohr and Schultz, 2014).

When opportunities are lacking, marketing may be sufficient to achieve appropriate behaviour by introducing a product or service into the environment that enables people to manifest their motivation and utilize their abilities. Examples can be the introduction of appropriate packaging sizes (and corresponding prices), or automation of certain food handling behaviours to save time (e.g., online shopping). These products or services can make it easier to perform food waste reducing behaviour, such that fewer resources (e.g., time, energy or money) are needed.

Transtheoretical Model (TTM)

The TTM (Prochaska, DiClementi and Norcross, 1992; Prochaska, 2013) is a well-established, psychology based behaviour change model that offers methods to assess and evaluate behaviours, and many underlying psycho-social influences. The TTM has been widely used to guide and evaluate interventions which target the prevention or reduction of unwanted behaviours (e.g. smoking), or the introduction of a new behaviour (e.g. exercise). The model is very adaptable having been shown to successfully measure, manage or change a range of behaviours from fruit consumption (De Vet et al., 2008); childhood obesity (Hametal, 2016); smoking cessation (Prochaska & Norcross, 2001); increasing physical exercise (Hellsten et al., 2008); increasing green eating behaviours (Monroe et al., 2015); to the promotion of cycling (Rose and Marfurt, 2007; Forward, 2014). Yet, the use of the TTM has not yet spread to the context of household food waste, although it would seem applicable to household food management behaviours, and behaviour changes that could reduce the large amounts of food that are currently wasted in homes (Davison, et.al., 2012).

The TTM consists of four main concepts, all related to behaviour change:-

1. Five 'Stages of Change' (from when a person is not thinking about changing a behaviour to the stage where a person has changed and is maintaining a new behaviour)
2. Decisional Balance (the pros and cons a person perceives as being related to changing a behaviour)
3. Ten Processes of Change (the use of underlying psycho-social factors that can influence behaviour change)
4. Self-Efficacy (belief in one's ability to perform a specific behaviour)

Briefly, the principles of the TTM (Prochaska, DiClemente, and Norcross, 1992) are that within any community, different people will be in different stages of change, with people in different stages of change perceiving different costs and benefits (pros and cons) related to altering their behaviour. Differences in the type and frequency of use of various psycho-social processes (processes of change) will also be occurring at different stages of change. In addition, people will have differing degrees of self-confidence about their ability to make a change to a specific behaviour (self-efficacy). Consequently, there is a need to develop different messages and interventions for different people in different stages of change. It is unlikely that people in different stages will all respond to, or be motivated by, the same type of message. These principles would also apply to householders in the community. Therefore using the TTM can help identify, measure, and encourage change in behaviours related to the wasting of food.

Each of the four main concepts of the TTM is now explained in detail. Firstly, examples are provided to explain how these concepts could be related to food management behaviours and household food waste. Secondly, examples are provided to explain how the concepts can be used in food waste avoidance campaigns and behaviour change interventions.

Stages of Change, Household Food Management Behaviours and Food Waste

Five stages of change can be passed through on the way to making changes and developing a new behaviour, or eliminating an old unwanted behaviour. Using similar stage descriptions that have been noted for the uptake of regular exercise (Reed et al., 1997), the stages of change for food management behaviours could be described as :-

1. *Pre-contemplation.* No thought about changing any usual behaviour. For example, a householder may have no thoughts about changing current behaviours such as ceasing to purchase more food than needed, or making better use of left-overs.
2. *Contemplation.* A change is considered, but at this stage there is no clear intention to make any changes in the near future. Here a householder may notice that too much food has been purchased, or that too much food remains uneaten and is discarded. Thoughts may begin to emerge about the possibility of not wasting food. However, at this stage the routine behaviours do not change.
3. *Preparation.* Having considered the possibility of change, a householder in this stage will usually start to make some plans or make a commitment to change. For example, consider purchasing food online to avoid the temptation of purchasing extra food that is being displayed in supermarkets, or seeking out recipes to reuse left over food. Here a new behaviour could even be trialled; such as sometimes making a new meal from left-overs.
4. *Action.* When in this stage a householder commences to regularly perform a new food management behaviour, for example regularly use left-over food for another meal.
5. *Maintenance.* At this stage the person has been regularly performing a new behaviour, or has ceased to perform an unwanted behaviour, for some time. Maintenance is usually achieved when the wanted behaviour has been performed for six months or more.

Householders in a maintenance stage would, for example, now be in a routine of always using left-overs; or always planning menus and purchasing food accordingly.

Figure 18.2 illustrates the stages of change, and shows how the TTM stages also accommodate the possibility of relapse, helping to understand how people may slip back to an old behaviour for a time, and then later once again contemplate changing back to the new behaviour. This seems to be a realistic approach as it can take time for people to completely give up an old behaviour, especially if that behaviour has become habitual, as habits are difficult to control (de Vries, Aarts, and Midden, 2011). Therefore, householders could take time to fully establish a new behaviour, and could perhaps slip back to some old, previously habitual food management behaviours. For example it may appear easier, and save time, to once again simply discard left-over food rather than think about re-using it.

<FIGURE 18.2 HERE>

Figure 18..2 : The TTM Stages of Change

(Adapted with permission from Davison, 2015; based on Prochaska & DiClementi, 1983)

Movement through the stages of change is likely to be cyclic as changing any well-established behaviour, will usually be difficult. This is because a behaviour that is being regularly performed brings with it some type of payoff (Skinner, 1953), or reward, for the person performing that behaviour – otherwise there would be no point in the behaviour being performed. For example, over-purchasing food in the supermarket may result in positive feelings and answer a householder's thoughts that it is better to have too much, rather than just enough, to feed the family. Or it may be easier, or even work in better with other household schedules and household members, to stop planning meals and therefore stop purchasing only

what is needed for meals. Thus convenience can be a motive for someone to stop considering a new behaviour for a while (or even permanently), or for someone to slip back to an old behaviour, even after performing a new behaviour for some time. So a cyclic movement of the stages allows for the possibility of movement in and out of the stages before a person finally establishes, and maintains, a new behaviour. This means that a householder who, for example stopped planning meals (relapse) may at some future time again start noticing the amount of food remaining unused and discarded, feel some concern or guilt about this, and again start considering how to avoid this waste (contemplation stage). The householder may start again gain to moving through the stages, and maybe this time will ultimately reach a stage of consistent planning meals and reducing food that previously remained unused (maintenance stage).

Measuring householders' stages of change can inform campaign developers and others about food waste avoidance behaviours that are currently being performed, and those that are not. The most common method of measuring stages for lifestyle behaviours is by the use of a simple five-item staging algorithm (Reed et al., 1997; Spencer et al., 2006). Figure 18.3 presents an example of an algorithm measuring one food management behaviour, where a single response can identify a person's stage of change. Algorithms of this type can also be formatted to assess a multiple number of behaviours, one by one. This is a useful way to measure several different food management behaviours related to food waste, as householders are unlikely to be in the same stage of change for all their food management behaviours.

<FIGURE 18.3 HERE>

(a) = Pre-contemplation; (b) = Contemplation; (c) = Planning; (d) = Action; (e) = Maintenance

Figure 18.3 : Stage of Change Algorithm

Knowing which desirable food management behaviours are frequently being performed by householders, and which are not, can help guide the development of messages and strategies for food waste avoidance campaigns. For example if a TTM algorithm, related to the behaviour of storing fresh fruit, indicated that large portion of a population were not storing their fresh fruit correctly, then information and messages in campaigns could focus more on targeting this behaviour. Whereas, if a TTM algorithm related to storing bread indicated most of the population were already freezing their bread and storing in the correct manner, then bread storage could receive less focus.

A hypothetical application of the TTM to food waste was presented by Davison et al. (2012). This was later followed by a trial application to food waste (Davison, 2015), where prior to developing an informational intervention, several key food management behaviours being performed by Australian householders (n = 926) were measured by stage of change algorithms (Davison, 2015). Results, presented in Table 18.4, showed wide variations in the number of householders performing the measured food behaviours, with this information then helping to guide the direction of a later food waste avoidance intervention.

Table 18.4: Stage of Change: Australian Householders' Food Management Behaviours

Food Management Behaviour	Number of Participants				
	PC	C	P	A	M
Checking food stocks prior to shopping	83 (10%)	14 (2%)	269 (32%)	58 (7%)	426 (50%)
Planning meals at least 2 days in advance	255 (30%)	42 (5%)	242 (28%)	56 (7%)	255 (30%)
Know exactly what intend to buy because have a written or mental shopping list	62 (7%)	15 (2%)	192 (23%)	63 (7%)	518 (61%)
Adhere to planned purchases and do not buy more	287 (34%)	20 (2%)	281 (33%)	49 (6%)	213 (25%)
Cook right amount of rice	229 (28%)	7 (9%)	88 (11%)	30 (4%)	453 (56%)
Cook right amount of pasta	213 (27%)	8 (1%)	100 (12%)	35 (4%)	445 (56%)
Use left-over food from one meal for another meal or snack	53 (6%)	14 (2%)	121 (14%)	41 (5%)	621 (73%)
Place majority of fresh fruit in the fridge	298 (35%)	15 (2%)	79 (9%)	26 (3%)	432 (51%)

(PC = Pre-contemplation; C = Contemplation; P = Planning; A = Action; M = Maintenance) From Davison (2015)

Decisional Balance

Decisional balance is the weighing up of the benefits (pros) and the costs (cons) of changing to a new behaviour. People in the lower stages of change are likely to see more cons related to making a behaviour change, whereas people in the higher stages will have come to see more pros. Across many behaviours, including those related to sunscreen use, smoking, and exercising (Prochaska et al., 1994b,) research has been able to show a clear crossover, whereby people in the middle stages of change reduce their perception of cons, and increase their perception of pros related to a new behaviour. This crossover has also been evident after measuring Australian householders' pros and cons related to the behaviour of discarding edible food to the household garbage bin (Davison, 2015), as shown in Figure 18.4

<FIGURE 18.5 HERE>

PC= Pre-contemplation; C =Contemplation; P= Planning; A= Action; M = Maintenance

Figure 18.5 : Decisional Balance: Crossover of Pros and Cons Scores (Davison, 2015)

Logically, when more benefits can be related to a new behaviour, there is more likelihood that a householder would be motivated to use the new behaviour. Therefore measuring the TTM concept of decisional balance can inform program developers, as knowing what is specifically hindering or helping householders to change one of their food management behaviours can then be targeted in campaigns.

Decisional balance can be measured using a ten or twenty item scale, with half the items relating to cons and half to pros. The creation of items is somewhat arbitrary and will differ for different behaviours but the underlying theme that was developed in early TTM research should

be maintained. For example, a high loading decisional balance scale item related to exercise (Marcus, Rakowski and Rossi, 1992b) was 'I would feel good about myself if I kept my commitment to exercise'. This statement can be adapted to 'I would feel better about myself if I discarded less edible food'. Examples, of a food management related pro and con item, drawn from recent research (Davison, 2015) are:-

PRO: Learning more about how to best manage my food at home could help me reduce the amount of money I now spend on food

CON: Making any changes to the way I usually manage the household food would take too much of my time and/or effort

Self-efficacy

When evaluating food management behaviours it may also be helpful to assess the TTM concept of self-efficacy, described as belief in one's ability to perform a specific behaviour. The higher one's self-efficacy the more likely a specific behaviour will be performed successfully (Bandura, 1982) and self-efficacy has been noted as a significant predictor of household general waste management in a UK population (Barr, 2007). Stefan et al. (2013) related perceived behavioural control (which has been linked to self-efficacy) to the shopping routines of Romanian consumers, and noted a lack of control was highly related to shopping for food and food waste. Self-efficacy has been measured using simple Likert type scales (Schorr et al., 2008).

If self-efficacy is shown to be low then strategies may be included in a campaign or intervention to help improve levels of confidence. Increasing skills is one method of increasing self-efficiency (Watson and Tharp, 2007); for example, encouraging attendance at workshops which show how to use left-overs or showing how to efficiently store food. Being shown how a new behaviour can reduce a problem, and then actually performing that new behaviour, could also help increase householders' beliefs about their ability to change.

Processes of Change, Household Food Management Behaviours and Food Waste

As already noted, people do not usually move through the stages of change in a quick or simple manner. A variety of external and internal factors can influence progression towards a new behaviour. Drawing on other influential behaviour change theories, the TTM concept of Processes of Change includes ten psycho-social processes related to changing a behaviour (five experiential or cognitive type processes, and five behavioural type of processes), as illustrated in Table 18.6.

Table 18.6: The TTM Processes of Change

Process	Description
<i>Experiential/Cognitive Processes</i>	
Consciousness raising	Efforts by an individual to seek new information and gain understanding about a problem
Dramatic relief	Experiencing and expressing feelings about one's problems
Environmental re-evaluation	Assess how a problem affects the physical environment
Self-re-evaluation	Assessing how one thinks and feels about a problem
Self-liberation	Choosing and committing to act, or believing personal change is possible
<i>Behavioural Processes</i>	
Social liberation	Awareness of availability and acceptance of alternative non problem behaviours; influences from others or the environment
Counter conditioning	Finding alternatives. Substitution of alternative behaviour for a problem behaviour
Helping relationships	Accepting, utilising the support of others
Stimulus control	Restructuring one's physical environment, controlling a situation and other causes that trigger a situation, using prompts
Reinforcement management	Being rewarded for making changes, changing the contingencies that control or maintain the problem

The processes describe how people change (Norcross, Krebs and Prochaska, (2011), and their use, especially the frequency of use, will differ according to a person's stage of change. For example, for smoking cessation (Prochaska et al., 1988) and mammography screening (Pruit et al., 2010), people in the early stages of change were found to mostly use the five experiential/cognitive type of processes, while the behavioural processes were mostly used in later stages. However, for some behaviours the use of the processes is not so clearly defined by each stage.

For a variety of health behaviours (Rosen, 2000) and for people who were increasing their fruit intake in the diet, (De Vet et al., 2008) both experiential and behavioural processes have been used in all stages, with the use of all processes increasing as stage of change increased. Results of pre-intervention and post-intervention surveys have found somewhat similar use of processes for household food management (Davison, 2015). Figure 18.5 highlights the pattern of processes used by householders at the pre-intervention survey (S1) and the post-intervention survey (S2). Those in a preparation stage of change (intending to stop placing edible food in their home garbage bins in the near future) or higher stages (not placing edible food in the bin) all increased their use of processes following a food waste prevention intervention. The experiential processes also remained the most frequently used processes across all the stages of change, although these cognitive type process use did decrease for those who were maintaining the desirable behaviour of not discarding edible food. This would seem a logical result as once a new food behaviour was well established then less on-going cognitive processing would be required, and a similar result for the use of experiential processes have also been found in some past exercise research (Marshall and Biddell, 2001).

<FIGURE 18.7 HERE>

Figure 18.7: Processes of Change. Frequency of Use. (Davison, 2015)

Using the TTM Processes of Change to Develop Campaign Messages

Campaign messages that encourage the use of the processes of change can help increase readiness to change, and also help motivate people to change. Table 18.8 illustrates how messages and strategies can be developed in the context of household food waste, for an experiential process (consciousness raising) and a behavioural process (counter conditioning).

Table 18.8: Examples of Strategies Based on Processes of Change

Process of Change	Food Waste Avoidance, Strategy Examples
Consciousness raising	<p>Being interested in information about household food waste. Being aware of own food management behaviours.</p> <p><i>Strategy: Messages to attract attention to amount of food that is wasted in households; messages that highlight that almost all households do waste some food – even though they think they don't. Where possible, keep questions and statements personal.</i></p> <p><i>E.g. 1. Ask “Do you know what food went in your bin today. 2. Highlight statistics for amounts of wasted edible food 3. Note the environmental and personal costs of wasting food</i></p>
Counter conditioning	<p>Rearranging or changing usual household procedures in order to avoid food being discarded.</p> <p><i>Strategy: Encourage a new behaviour.</i></p> <p><i>E.g 1. This could be as simple as explaining that bread will keep fresher if frozen, rather than if stored in containers or if stored in the fridge. 2. Encourage rotation of refrigerated food 3. Suggest any smaller portions of refrigerated food be grouped in larger trays that can be easily moved forward for inspection (to avoid forgetting about them)</i></p>

The TTM advocates that different messages for change, relating to different processes, should be delivered to different people at different times, according to their various stages of change. However, from the perspective of an economical intervention to reduce food waste in a large population, it would seem practical, and just as useful, to deliver a single intervention which encourages the use of all ten processes of change. As all processes are used to some extent at any one time, all process-related messages and strategies could be delivered at the one time - with the expectation that as different householders will be in different stages of readiness, the appeal and the frequency of use of the strategies will differ somewhat, but everyone should pay attention to at least some of the delivered messages and strategies. This method was adopted when groups of Australian householders were presented with food waste avoidance information, in either a paper calendar carefully designed to include messages relating to all TTM processes which was posted to householders; or similar information in emails which were delivered online to some householders (Davison, 2105). The TTM can then be used at a population level to gain a snapshot of a population and the spread of its behaviours across the desired behaviour spectrum.

In the TTM food waste trial, after four months Australian householders who received, and were reading, the calendar reduced self-reported discarded food by forty-seven percent, and those who accessed the online information reduced their discarded food by forty percent (Davison, 2015). Interestingly, results were not statistically significant with a control group also reducing their discarded food by thirty percent. All the householders had been exposed to the TTM concepts in items they responded to in a pre-intervention survey. To some extent, this may have also increased the control group's awareness about their discarded food (the TTM process of consciousness raising). The pre-intervention survey may have also encouraged some self-monitoring which may also contribute to positive behaviour changes (Watson and Tharp, 2007). Regardless, the trial was able to show that the TTM can be successfully applied to food waste and to successfully capture a population's behaviour change as a result of marketing intervention.

A further point of interest from the Australian research is that prior to any intervention, all householders believed they only discarded between two and three cups of edible food weekly – discarded amounts that appear much smaller than the weekly 2.2 kilograms of edible food an independent household garbage bin audit had previously revealed for Australian households (Sustainability Victoria, 2014). Thus, although information and messages appeared to be able

to reduce amounts of wasted food, householders still appeared to be under-estimating the amount of their waste – highlighting one of the challenges that still needs to be addressed by campaign developers and people working in food waste in general.

Conclusion

This chapter has introduced the MOA and the TTM, two models which can be used to help understand householders' motives and the influences related to the way they manage their food in the home. Both models help to identify barriers, including important internal barriers, that can prevent householders from reducing amounts of food they currently discard. The MOA and the TTM address also householders' readiness to change and offer clear guidelines to help increase motivation to change. The models can also guide interventions or campaigns aimed at household food waste avoidance.

The MOA framework stresses that desirable behaviours will be performed when motivation, abilities and opportunities are present. For food waste reducing behaviours to be performed, people should consider it to be in their self-interest, thus that it is important in itself and in comparison to other valued goals. Additionally, people should have the right skills and knowledge sets to be able to perform food waste reducing behaviours. Lastly, people should have the opportunities to perform the behaviours without needing to spend too much time, energy or money to do so. In case one of the three elements is lacking, different interventions may be used to overcome this. Lacking motivation can be overcome by introducing regulatory incentives, nudging, or interventions that reinforce motivation such as prompts, affective campaign appeals, competition, social influences or commitment. Lacking abilities can be overcome by providing informational campaigns which consists of tips and tricks to improve peoples' food handling habits. Lastly, new products or services can be introduced in case of lacking opportunities.

Using the TTM concept of the stages of change, desirable food management behaviours that householders are performing, or not performing, can be identified in large populations. With additional knowledge gained from the TTM concepts of decisional balance, processes of change, and self-efficacy, appropriate strategies can be created to help householders

become more aware of their own food management behaviours, to ready themselves for change, and to ultimately perform more of the key behaviours that research has already related to food waste avoidance. Raising levels of awareness about householders' own contributions to food waste is always an important first step towards discarded food being reduced. Unless a householder believes some food is discarded in his or her home, and sees this as waste, no attention will be paid to messages that show how to avoid food waste in homes.

Both behaviour change models discussed in this chapter offer fruitful avenues to further explore for people who are in the position of creating interventions to reduce food waste.

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