What are the current health promotion messages for young adults in diet and physical activity?

TECHNICAL REPORT

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This literature review will identify current health promotion (HP) messages that could be relevant for young adults, with respect to diet and physical activity, for obesity prevention. This will be done using both published, using a rigorous search strategy, and grey literature restricted to resources that typical young adults of Aberdeen would have access to. All of the messages found will then be discussed and compared with respect to content, format of presentation, delivery method and relevance.

Obesity is a major global public health problem (Ng *et al*, 2014). The 2015 Scottish Health Survey shows that 65% of adults were classified as overweight and 29% were classified as obese (Scottish Health Survey, 2016). Having higher levels of adiposity has been linked to a number of health complications such as an increased risk of hypertension, type 2 diabetes, cardiovascular disease and certain forms of cancer (Seidell and Halberstadt, 2015). Therefore, obtaining and maintaining a healthy body weight reduces the risk of non-communicable diseases making prevention an important public health challenge.

In Scotland, current obesity prevention strategies focus on education for families and young children to help establish healthy choices at an early age (Scottish Government, 2010). However, evidence suggests that the most rapid age for weight gain is found within young adults, which is likely to increase the risk of obesity seen with increasing age (Ng *et al*, 2014). This suggests that this age group should be targeted for prevention. Young adults undergo several life changes, such as leaving home, which results in them having more control over their lifestyles than before. Amongst all the changes, this transition period provides an opportunity to encourage young adults to also include healthy lifestyle choices (Giles and Brennan, 2015) and in doing so help prevent possible weight gain later in life.

One of the most common HP strategies is communicating HP messages to increase awareness and educate individuals on health behaviours (Green *et al*, 2015). Studies have demonstrated HP messages to be more effective in altering behaviour when targeted towards a specific population (Rekhy and McConchie, 2014; Green *et al*, 2015). Therefore, targeting messages towards young adults could be an effective way to slow the weight gain seen in young adults to reduce obesity levels. However, young adults have been critical and reported that current HP messages on physical activity are not engaging (Poobalan *et al*, 2012), demonstrating that these messages require further investigation in order to be relevant for this age group. This review identifies the current HP messages for physical activity and diet that young adults are exposed to, before going on to assess these messages and gauge ways to better tailor them in a later project.

A comprehensive search strategy was developed to identify relevant papers within published literature databases and grey literature resources (Appendix 1). Key terms identified were “young adults”; “diet”; “exercise” and “health promotion messages”. These were used along with synonyms to search for relevant literature. This identified 12 published articles inclusive of the 18 to 25 age group but only one discussed targeting HP messages towards young adults specifically. The grey literature search identified 15 sources including local, national and international resources. From these, 40 HP messages in diet and exercise met the inclusion and exclusion criteria. Of the 40 messages determined relevant, none were specifically targeted towards 18 to 25 year olds.

Through familiarisation of the literature, themes emerged relating to tailoring of the HP messages (HPM), how they were displayed (including their format), and the delivery method. The emergent themes will be discussed in this review, with comparisons made between the published and grey literature. The published literature did not identify any qualitative studies discussing HPM, most were randomised controlled trials (RCT). The full characteristics of the retained published and grey literature is displayed in Appendix 2.

Tailoring Health Promotion Messages

Although the published literature mentioned the use of HPM, few articles described their messages and even fewer provided sufficient information to view their messages in order to assess them. Most were tailored to a particular audience or person (including the age range of interest here), but only one targeted young adults in particular, Baker *et al*. (2010). This study used an RCT to investigate tailoring HPM specifically for young adults for healthy eating behaviours. They used a healthy eating leaflet provided by the British Nutrition Foundation (Baker *et al*, 2010) and altered 12% of the original text to contain more relevant information for young adults. Their information was based on topics thought to be more engaging for this age group – including foods for weight management and increased energy - which had been demonstrated to be important motivators for this age group (Chambers *et al,* 2008). The relatable character and testimonies were used to increase the self-efficacy of participants (Baker *et al*, 2010). The effects of this altered leaflet on one group of participants were compared against a group who had an unedited leaflet and another who did not have a leaflet promoting healthy eating behaviours at all. Participants given the tailored leaflet were seen to consume higher levels of fruits, vegetables, lean meats and fish than the participants with either of the control leaflets. Although these results demonstrate the importance of tailored HP messages, the study only had a short term follow up of two weeks. Any long-term impact on habitual diet still has to be evaluated. Some variables only underwent single item measures, so accuracy may be poor, and may not represent the true effects seen from the leaflet.

HPM for Students

Although only one study looked at HPM for young adults specifically, several did discuss HPM for students. There were 4 studies identified for a student population promoting health (Ornes and Ransdell, 2010; LaChausse, 2012; Brown *et al*, 2014; Okazaki *et al*, 2014). While the majority of these had an average age within young adult range (18-25 years), there are several reasons why these cannot be determined as representing young adults in general. Firstly, it may be safe to assume that the majority of students are between the ages of 18 to 25 years old, but it is also possible that mature students may have been involved in these studies and could impact on results (Vendetti *et al*, 2014). Secondly, students generally have higher education levels and reading ability than the general population, therefore their health literacy, understanding of HPM and exposure would be different than other individuals within their age group (Van der Heide *et al*, 2013). Thirdly, the use of students for an intervention may have different effects than a wider population sample of this age group due to the ability of investigators to incorporate the intervention into a reward scheme to further educational achievements of participants. An RCT by LaChausse (2012) states that their students received course credits for participating in these studies, and Brown *et al*. (2014) ran an RCT which offered participants financial incentives for completion of the surveys. The use of such rewards means that the interest in the wider population may not be accurately represented. Finally, use of these interventions promoting healthy behaviours may not be easily transitioned between student environments into working life, the time when students eventually make the transition into this phase of life (LaChausse, 2012). However, there were several suggestions on how to target students which could be evaluated for the wider young adult population, such as using phone applications for self-monitoring or personalisation of messages (Brown *et al*, 2014). The search of the grey literature demonstrated only one resource targeted at students (University of Aberdeen (UOA), 2017). This resource contained only a small amount of information regarding eating behaviour and physical activity, which was not specifically targeted towards the environment. Although some of this could be used outwith the environment, its limited nature does not provide much information for young adults. This suggests that the current HP messages in the grey literature are not tailored specifically for

students. However, there may be other environments which are targeted instead of the university setting.

HPM for Workplaces

The workplace has a variety of new challenges and barriers to maintaining healthy lifestyle in terms of nutrition and physical activity, which must be considered when tailoring messages to young adults and this environment. The work environment was a common feature amongst the retained literature with an RCT ran by Gans *et al.* (2015), an non-randomised controlled trial by Haruyama *et al.* (2013) and a cluster RCT by Robroek *et al*. (2012) all focussing their studies on the workplace. Although these studies demonstrate the effects of tailoring HPM towards an individual's environment, the average age of the participants was much higher than the young adult range, with the majority of participants in each study being between 30-50 years old. Targeting to the work environment was also demonstrated in the grey literature with 8 resources from the British Heart Foundation (BFH, 2012a; BHF, 2012b; BHF, 2014; BHF, 2015a; BHF, 2015b; BFH, 2015c; BHF, 2015d; BHF, 2015e). These resources employ various strategies, demonstrated in the published studies, such as goal setting and tailoring messages to the work environment to improve health behaviours. However, there seems to be no formal evaluation of how these resources effect behaviour to determine the influence of these materials. Providing details on why and how these resources were constructed would allow for improvements to be made in these processes.

Personalised HPM

Although worksite targeting was used as a way of engaging particular populations, they were also used as a base to deliver interventions which were personalised for an individual. Haruyama *et al.* (2013) and Robroek *et al*. (2012) carried out studies on worksites, however, Gans *et al.* (2015) used worksites to trial their intervention, which was specifically targeted and personalised for individual use. Personalised interventions were also seen in the article by Fayet-Moore and Pearson (2015) and an RCT by Soetens *et al.* (2014). They aimed to personalise the advice and HPM to the individual and various characteristics of their lifestyle. Although personalisation could improve the effects on behaviour (Celis-Morales *et al*, 2016), this is hard to achieve on a national scale due to the cost and/or poor retention rates (Neville *et al*, 2009), depending on how the intervention is delivered. The grey literature might reflect this since no resources were identified as being tailored for personalised use, instead tailoring towards groups or environments was highlighted instead.

Weight Loss and HPM

Although various obesity prevention tools provide healthy eating messages for public health, commercial weight loss tools are also available to individuals. The retained literature did contain one study which discussed the cost-effectiveness of a commercial slimming club against a government-funded weight loss programme (Cobiac *et al*, 2010). Weight-loss clubs specifically tailor their health messages for their members, to ensure that the health messages around diet and exercise provided are focussed on weight loss rather than obesity prevention (Gudzune *et al*, 2015). There was also an example of a weight-loss club found within the grey literature in the format of a leaflet providing information on the Healthy Helping weight loss group for NHS Grampian (NHS Grampian, 2016a). Although these messages aren't specifically for young adults, the barriers which individuals may face could be similar, such as time, cost and emotional eating (Metzgar *et al*, 2014; Ashton *et al*, 2015; Holley *et al*, 2015). There is also evidence that young adults see weight control as a major motivator of obesity prevention behaviours (Ashton *et al*, 2015; Holley *et al*, 2015). Health messages which

provide information on how to overcome these barriers, like the commercial weight loss clubs, could be effective for tailoring HPM for young adults.

Presentation Formats

Although the content of how health messages are tailored is important, the presentation format of these messages can also be an important factor. A variety of different methods of how HPM could be presented to the population was observed during the literature search. Formats identified were: "expert" lead sessions (Cobiac *et al*, 2010), HP programmes (Ornes and Ransdell, 2010; LaChausse, 2012; Robroek *et al*, 2012; Haruyama *et al*, 2013; Okazaki *et al*, 2014), text and images (Baker *et al,* 2010; Brown *et al*, 2014; Fayet-Moore and Pearson, 2015), multiple formats (Soetens *et al*, 2014; Gans *et al*, 2015) or unknown (Washington *et al*, 2015). The majority of published studies presented their HPM as programmes (n=5), however some used multiple presentation types and compared them within the study.

The health promotion programmes (HPP) described within these studies all reported that they included common themes: education sections, some form of continual monitoring and an intervention period ranging from 4 weeks to 2 years, which is longer than some of the other retained studies (none of which have an intervention period longer than 9 weeks).

The use of longer intervention periods seen within the HPP provides longer periods of support for participants for changing behaviour and developing the skills required to sustain this behaviour change (Teixeira *et al*, 2015). This was demonstrated in all of the HPP studies apart from Robroek *et al*. (2012). However, Robroek *et al*. (2012) did not have a control group (i.e. with no HPP) due to their study design, which may have impacted the results. There is a risk that a longer intervention period may be viewed as having additional participant demands, which in turn can reduce recruitment and retention rates (Bower *et al*, 2014) , making such studies less generalisable to the wider population.

All of the published HPPs, apart from Ornes and Ransdell (2010), detailed the use of continuous monitoring or self-assessment throughout their programmes. These programmes asked for participants to set their own goals, to complete self-assessments or to do quizzes throughout the duration of the programme – these were presented as stand-alone tasks or were combined as part of the intervention. The use of self-monitoring has been demonstrated as an important behaviour change technique for weight loss interventions (Krukowski *et al*, 2013) and reducing sedentary behaviour (Gardner *et al*, 2015).

The grey literature search only found one HPP study in the form of the Healthy Helpings leaflet (NHS Grampian, 2016a), where again longer term delivery of health promotion messages was recommended. The use of HPP as a format to present messages demonstrates the benefits of certain techniques in communicating HPM. However, these require further evaluation to establish if it is the format which is effective, or simply the length of time given to support health behaviour changes.

Text and Images Presentations

Although HPPs presented had various messages around HP, the actual description of how these health messages were displayed was not detailed within these studies. Three studies did however, discuss the presentation types they employed, especially the use of text and images to communicate their HPM (Baker *et al*, 2010; Brown *et al*, 2014; Fayet-Moore and Pearson, 2015). These studies all focussed on tailoring existing HPM relating to diet from national bodies to make them more effective in altering diet behaviours for their target audience. Only Baker *et al*. (2010) and Brown *et al*. (2014) tested

whether targeting text and image based messages did improve dietary behaviours – unfortunately both of these studies had short term outcome measures (2 weeks and 7 weeks), so any long term behaviour change could not be evaluated. Although Baker *et al*. (2010) made comments about the whether the images or text were effective components, an evaluation may warrant further investigation. Text and image presentations were also commonly demonstrated in the grey literature, with 35 out of the 40 different resources using either one or a combination of these. These used material which ranged from government nationwide resources such as the physical activity infographic (Department of Health, 2016), or the Eatwell guide (Food Standards Scotland, 2016), to the locally available resources such as the UOA's Clued Up website (University of Aberdeen, 2017) and the Walk Aberdeen website (Sport Aberdeen, 2017a). These resources demonstrate a wide variety of different types of text and images. Unfortunately, no clear evidence on why these have been chosen for the intended groups has been given. There seems to be a paucity of evidence around the use of different text and images on health behaviour changes in both the grey and published literature.

Combining Presentation Methods

Other retained studies also discussed and compared multiple formats in order to try to establish the most effective forms of communicating HPM (Soetens *et al*, 2014; Gans *et al*, 2015). These studies discussed differences between using video communication against text-based communication or a combination approach – with both concluding that combining the text-based information along with the video communication had the most effect on health behaviours at follow up. The use of multiple formats in the grey literature also included the use of videos, textual information, social and mass media advertisements, as demonstrated by the Food Standards Scotland Healthy Eating Campaign (2017), the Take Life On website (Scottish Government, 2008) and #naeexcuses campaign (Sport Aberdeen, 2017b). Although the aim of multiple formats is to increase awareness, these still need to be evaluated for specific target audiences to ensure they are appropriate (Loss *et al*, 2014; Kuttschreuter *et al*, 2014). Social media has been suggested as an effective way to communicate HPM, especially for young adults as they tend to be primary users (Korda and Itani, 2013). However, the literature search found there is currently a lack of research investigating the use of social media as a tool to improve health (Laranjo *et al*, 2014).

Delivery Methods

The final theme observed during this review was the method of how messages were delivered. The published literature discussed a variety of different delivery methods for their HPM. These may be grouped into several sub-themes: group sessions (Cobiac *et al*, 2010), internet (Ornes and Ransdell, 2010; LaChausse, 2012; Robroek *et al,* 2012; Haruyama *et al*, 2013; Okazaki *et al*, 2014; Soetens *et al*, 2014; Washington *et al*, 2015;), leaflets or brochures (Baker *et al,* 2010; Fayet-Moore and Pearson, 2015) and texting (Brown *et al*, 2014; Gans *et al*, 2015).

Internet Use

The most commonly used delivery method seen throughout the literature was the use of the internet. The internet was also commonly observed within the grey literature, used by 7 different resources, such as the Take Life On website (Scottish Government, 2008) and the UOA Clued Up website (UOA, 2017). This delivery method has the ability of reaching vast numbers at relatively low costs compared to other methods (Okorodudu *et al*, 2015). However, recent evidence suggests that internet-based interventions for health behaviours tend to be poorly adhered to and thereby have a lower effect on changing behaviours (Kohl *et al*, 2013). There is also evidence suggesting a higher dropout rate seen in web-based interventions which focus on changing health behaviours (Schulz *et al*, 2014; Okorodudu

et al, 2015). However, these effects may depend on the structuring of the intervention - using strategies which encourage intervention use, such as reminders or tasks, could improve use (Kohl *et al*, 2013).The use of reminders can take the form of other technology, such as text messages, as demonstrated by Brown *et al*. (2014) and Gans *et al*. (2015). These approaches allow for continued contact and support to participants, which may increase participation if given in smaller, regular messages (Donaldson *et al*, 2013). Although the use of reminders was not a specific part of the grey literature, the use of social media in a similar way was also alluded to for the Healthy Eating Campaign (Food Standards Scotland, 2017). Using the new technologies - such as internet or text messages - could be an effective way to deliver HPM but further research is required.

Group Sessions

More traditional interventions for weight control which are highly structured were demonstrated in the group led session's literature (Cobiac *et al*, 2010). Group sessions provide individuals with regular educational sessions but within a group thus gaining support from each other as well as from the research team. These achieve more general lifestyle changes rather than focussing on individual behaviours through focusing on multiple behaviours. Although, combined interventions (i.e. encouraging more than one behaviour change e.g. physical activity and diet) have been shown to be more effective than focussing on one behaviour alone (Johns *et al*, 2014), group sessions may be an effective way to tackle several different behaviour changes. However, they are generally not a cost-effective strategy for tackling health behaviours of a population (Cobiac *et al*, 2010). None-the-less, there is an increase of group led sessions being conducted online to spread health messages, but the effects compared to traditional group meetings may still require evaluation (Collins *et al*, 2013). This development in delivery could provide the support of group led sessions with the low-cost access of using the internet, but requires careful structuring to ensure the effective components of these delivery methods still have their intended effects.

Overall, this literature review has demonstrated the lack of HPM in diet and exercise tailored for young adults, in both the published and grey literature. There are examples of message tailoring towards other groups, such as students or work place employees. However, they face various different motivators and barriers from their environments which could impact the transferability of messages between different environments (LaChausse, 2012). Appropriate health messages which can be used for young adults regardless of their environmental pressures may be more effective in establishing long term behaviour changes. There is evidence that using personalised health messages could be effective in changing behaviour (Celis-Morales *et al*, 2016), however this may not be a cost-effective strategy for a large population and require further evaluation. Although tailoring HPM is important for changing health behaviours, the presentation format of these messages was also demonstrated to be important. There is a range of formats being researched in the published literature with the most common formats also being demonstrated in the grey literature. Although longer HPP look effective in altering long term health behaviour, these may not be possible to use in a larger population (Bower *et al*, 2014). A detailed evaluation about the effective aspects of these programmes, such as self-monitoring or assessments, is needed to determine if these could be incorporated into resources available for promotion to the public. The use of different presentation formats could be used to target particular subgroups, such as online formats for young adults, however the formats must be engaging to promote use and interest (Loss *et al*, 2014; Kuttschreuter *et al*, 2014). The different formats between the grey and published literature suggests that discussions between the researchers and stakeholders may be required to determine the optimal format for promoting health messages to their target population. Further evaluation is also required for the delivery method of the HPM, as

demonstrated by the literature. The published literature has demonstrated an increasing number are investigating the use of modern technologies such as internet or text messages, whereas the grey literature still prefer printed materials, which is still shown to be relevant in this age group (Poobalan *et al*, 2016). The technological methods are able to reach a large number of individuals at a relatively low cost, but their lack of engagement with participants could reduce the effects of messages (Kohl *et al*, 2013). The published literature search identified no qualitative studies. This would provide more in-depth detail of how HPM should be tailored, provide evaluation about the current HPM, and determine what components of tailoring are important to drive behaviour changes.

In conclusion, the studies and grey resources discussed during this review have highlighted the importance of tailoring messages, formats and delivery methods towards the audience of interest. However, only one study was identified that targeted specifically on young adults, an age that arguably is one of the most important periods to home in on for lifestyle behaviour change. Future research is warranted in order to develop targeted HPM focussing on diet and exercise for young adults, along with using qualitative methods to discuss and help to develop these messages. There is also a need for further evaluation in current HPM tailoring, presentation format and method of delivery to determine the true effects and effective components of these messages.

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Appendix 1 – Search Strategy

Published Literature Search Terms:

1. young adult/
2. (young adj 1 people) .tw
3. (young adj1 person$) .tw
4. (18-25) .tw
5. (“18” adj1 “25”) .tw
6. (eighteen adj1 twenty$) .tw
7. Or /1-6
8. health promotion/
9. (promot$ adj1 health$) .tw
10. (health$ adj1 messag$) .tw
11. Health education/
12. (health$ adj1 educat$) .tw
13. Or/ 8-12
14. Diet/
15. Diet$ .ti
16. (health$ adj3 (diet$ or eat$ or food$)) .ti
17. Exercise/
18. Exercis$ .ti
19. (physical adj1 activit$) .ti
20. OR/ 14-29
21. Pamphlet .tw
22. Leaflet$ .tw
23. Brochur$ .tw
24. Internet .tw
25. OR/21-24
26. 7 AND 13 AND 20 AND 25

Sources: MEDLINE, EMBASE, SCOPUS

Grey Literature Search Terms:

“health promotion” “health message” “health education” “ diet” “healthy eating” “physical activity” “exercise”

“Young people” “young adult” “ 18 to 25” “young people”

Sources:

NICE, DoH, FFS, SIGN, NHS, BNF, FPH, Government websites.

Charities- BHF, Heart UK, National Obesity Forum, Diabetes UK, British Obesity Society, Obesity Action Coalition.

POPULATION:

Included: adult, young adult, 18-25 years, young people, youth

Excluded: families, children, under 18 years, over 65 years, elderly adults

TOPICS:

Included: Health promotion message, Health promotion programme, Health promotion campaign, physical activity, exercise, diet, healthy foods, moving, healthy choices,

Excluded: Mental health, alcohol, drugs,

DATE: messages no older than 2010 will be included.

COUNTRIES: UK, Ireland, USA, Australia, New Zealand, Canada will be included

FORMAT: All format versions included

Appendix 2- Tables of Characteristics of the Retained Literature.

Table 1: Table demonstrating the tailoring of health promotion messages observed in the retained literature and frequency.

Tailoring of grey and published literature resources and frequency				
		Literature source		Total
		Published	Grey	
Tailoring theme	Ethnic Group	**1** (Washington *et al*, 2015)	**0**	**1**
	Individuals	**5** (Robroek *et al*, 2012; Haruyama *et al*, 2013; Soetens *et al*, 2014; Fayet-Moore and Pearson, 2015; Gans *et al*, 2015)	**0**	**5**
	Learning Disabilities	**0**	**1** (NHS Health Scotland, 2011)	**1**
	Location	**0**	**3** (NHS Health Scotland, 2010; Sport Aberdeen, 2017a; Sport Aberdeen, 2017b)	**3**
	None	**0**	**26** (Scottish Government, 2008; British Heart Foundation (BHF), 2012c; BHF, 2012d; BHF, 2012e; BHF, 2012f; BHF, 2012g; NHS Health Scotland, 2013a; NHS Health Scotland, 2013b; British Dietetics Association (BDA), 2014a; BDA, 2014b; BDA, 2014c; NHS Health Scotland, 2014; NHS Grampian, 2014; World Health Organisation (WHO), 2014; BDA, 2015; BHF, 2015f; BHF, 2015g; NHS Grampian, 2015; WHO, 2015; BDA, 2016a; BDA, 2016b; Department of Health, 2016; Food Standards Scotland, 2016; NHS Grampian, 2016b; Nutrition and Diet Resources, 2016; Food Standards Scotland, 2017)	**26**
	Students	**4** (Ornes and Ransdell, 2010; LaChausse, 2012; Brown *et al*, 2014; Okazaki *et al*, 2014)	**1** (University of Aberdeen (UoA), 2017)	**5**
	Weight Loss Groups	**1** (Cobiac *et al*, 2010)	**1** (NHS Grampian, 2016a)	**2**
	Worksite	**0**	**8** (BHF, 2012a; BHF, 2012b; BHF, 2014; BHF, 2015a; BHF, 2015b; BHF, 2015c; BHF, 2015d; BHF, 2015e)	**8**
	Young Adults	**1** (Baker *et al*, 2010)	**0**	**1**
Total		**12**	**40**	**52**

Table 2: Table demonstrating the format of HP messages and frequency observed in the retained literature.

Presentation format of messages presented and frequency				
		Literature source		Total
		Published	Grey	
Presentation theme	"Expert" led sessions	**1** (Cobiac *et al*, 2010)	**0**	**1**
	HP Programmes	**5** (Ornes and Ransdell, 2010; LaChausse, 2012; Robroek *et al*, 2012; Haruyama *et al*, 2013; Okazaki *et al*, 2014)	**1** (NHS Grampian, 2016a)	**6**
	Multiple	**2** (Soetens *et al*, 2014; Gans *et al*, 2015)	**3** (Scottish Government, 2008; Food Standards Scotland, 2017; Sport Aberdeen, 2017b)	**5**
	Text and Images	**3** (Baker *et al*, 2010; Brown *et al*, 2014; Fayet-Moore and Pearson, 2015)	**35** (NHS Health Scotland, 2010; NHS Health Scotland, 2011; BHF, 2012a; BHF, 2012b; BHF, 2012c; BHF, 2012d; BHF, 2012e; BHF, 2012f; BHF, 2012g; NHS Health Scotland, 2013a; NHS Health Scotland, 2013b; BDA, 2014a; BDA, 2014b; BDA, 2014c; NHS Grampian, 2014; NHS Health Scotland, 2014; WHO, 2014; BHF, 2015a; BHF, 2015b; BHF, 2015c; BHF, 2015d; BHF, 2015e; BDA, 2015; BHF, 2015f; BHF, 2015g; NHS Grampian, 2015; WHO, 2015; BDA, 2016a; BDA, 2016b; Department of Health, 2016; Food Standards Scotland, 2016; NHS Grampian, 2016b; Nutrition and Diet Resources, 2016; Sport Aberdeen, 2017a; UoA, 2017)	**38**
	Unknown	**1** (Washington *et al*, 2015)	**0**	**1**
	Website Links	**0**	**1** (BHF, 2014)	**1**
Total		**12**	**40**	**52**

Table 3: Table demonstrating the delivery of HP messages and their frequency observed in the retained literature.

Delivery of Messages and Frequency				
		Literature source		Total
		Published	Grey	
Delivery theme	Game	0	2 (BHF, 2015b; BHF,2015d)	2
	Group Sessions	1 (Cobiac *et al*, 2010)	0	1
	Infographic	0	1 (Department of Health, 2016)	1
	Information Sheet	0	13 (BHF, 2012b; BHF, 2012c; BHF, 2012d; BHF, 2012e; BHF, 2012f; BHF, 2012g; NHS Health Scotland, 2013a; BDA, 2014b; BDA, 2014c; BDA, 2015; BHF, 2015c; BDA, 2016a; BDA, 2016b)	13
	Internet	7 (Ornes and Ransdell, 2010; LaChausse, 2012; Robroek *et al*, 2012; Haruyama *et al*, 2013; Okazaki *et al*, 2014; Soetens *et al*, 2014; Washington *et al*, 2015)	7 (Scottish Government, 2008; BHF, 2014; WHO, 2014; WHO, 2015; Sport Aberdeen, 2017a; Sport Aberdeen, 2017b; UoA, 2017)	14
	Leaflet	2 (Baker *et al*, 2010; Fayet-Moore and Pearson, 2015)	9 (NHS Health Scotland, 2010; NHS Health Scotland, 2011; NHS Health Scotland, 2013b; NHS Grampian, 2014; BHF, 2015E; NHS Grampian, 2015; NHS Grampian, 2016a; NHS Grampian, 2016b; Nutrition and Diet Resources, 2016)	11
	Multiple	0	2 (NHS Health Scotland, 2014; Food Standards Scotland, 2017)	2
	Poster	0	6 (BHF, 2012a; BDA, 2014a; BHF, 2015a; BHF, 2015f; BHF, 2015g; Food Standards Scotland, 2016)	6
	Texting	2 (Brown *et al*, 2014; Gans *et al*, 2015)	0	2
Total		12	40	52