

Passive interventions in primary healthcare waiting rooms are effective in promoting healthy lifestyle behaviours: an integrative review

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Abstract

Primary health care waiting rooms have the potential to provide health-promoting environments to support healthy lifestyle behaviours such as smoking cessation, weight management and safe contraception. Passive interventions are cost-effective and continually available within an environment or setting, allowing individuals to interact, engage and learn about topics. The aim of this study was to undertake an integrative review to investigate the effectiveness of passive health-related waiting room interventions for improving healthy lifestyle behaviours, as well as precursors to behaviour change. The integrative review encompassed five phases: problem identification, literature search, data evaluation, data analysis and presentation of results. Quantitative, qualitative and mixed methods studies were included. Of the 9,205 studies originally identified, 33 publications were included and grouped under four areas: knowledge about a health condition or behaviour, attitudes and intentions towards a health condition or behaviour, health care use and interactions, and health-related behaviours. Overall, the passive interventions had a general positive influence on knowledge, intentions, health care use and behaviours. Variable outcomes were reported regarding attitude towards a health topic. Few studies were assessed as both high quality and as the highest suitability to assess effectiveness of interventions. Consideration of the clinical significance of improvements is warranted prior to implementation of future interventions. Overall, passive waiting room interventions appear to be a promising approach to effectively promoting improvements in healthy lifestyle behaviours.

Additional keywords: health promotion, health behaviour, chronic disease.

Summary Statement

What is known about the topic?

- Primary health care waiting rooms are ideal environments to implement health promotion interventions. Passive interventions are cost-effective and continually available within an environment, allowing individuals to interact, engage and learn.

What does this paper add?

- This review suggests that passive waiting room interventions appear to be a promising approach to effectively promoting improvements in healthy lifestyle behaviours and are recommended for consideration in future practice.

Introduction

Health care within developed countries has experienced a shift in focus from communicable to non-communicable chronic diseases (Beaglehole & Yach, 2003). The World Health Organization (WHO) has developed recommendations for the prevention and management of chronic diseases including obesity, type 2 diabetes, cardiovascular disease, cancers, dental diseases and osteoporosis (WHO & Food and Agriculture Organization, 2002). Recommendations emphasise the importance of healthy lifestyle behaviours including healthy dietary intake, regular physical activity, maintenance of optimal body weight, avoidance of smoking and limiting alcohol intake (WHO & Food and Agriculture Organization, 2002). Facilitating healthy lifestyle behaviours is therefore a global priority for health care systems (WHO, 2009).

Approximately 90% of health care services are provided in primary health care settings, including general practice clinics, allied health service clinics, and emergency outpatient departments (Rao & Pilot, 2014; Smith et al., 2013). Over 86% of the Australian population receive health care services within the primary health care setting each year (Britt et al., 2014), highlighting opportunities to embed health education and health promotion as a core part of business. Primary health care is increasingly focused on the importance of preventive care, including facilitating healthy lifestyle behaviours for better management and prevention of chronic disease (WHO, 2008). Therefore, it is imperative that primary health care settings are an environment that supports healthy lifestyle behaviours.

Patients spend considerable time in primary health care waiting areas prior to

receiving care from health professionals (Oermann, 2003). Waiting room environments provide an important opportunity to implement passive health promotion interventions that educate patients, family members, and others who accompany patients for their appointments regarding healthy lifestyle behaviours (Oermann, 2003). A passive intervention refers to health promoting material continually available as part of the setting or environment, allowing individuals in waiting rooms to interact, engage and learn about important health topics (Freda et al., 1994). Examples of passive interventions include health promotion via brochures, posters, internet kiosks/tablets, and videos. Passive interventions do not require human involvement, and therefore provide a cost effective approach to promoting healthy lifestyle behaviours that can be implemented consistently across primary health care settings. However, existing literature relating to the effect of passive interventions on healthy lifestyle behaviours have not been synthesised and critically reviewed.

Understanding the impact that passive health promotion interventions in waiting rooms have on healthy lifestyle behaviours may be used to inform future interventions in this setting. Specifically, this will identify possible factors that contribute to successful outcomes in healthy lifestyle behaviours, such as precursors to behaviour change, including knowledge and intentions relating to a behaviour. Due to the heterogeneity of previous interventions implemented in primary health care waiting rooms, traditional literature review approaches, such as systematic reviews, may not generate a complete understanding of the topic due to more rigid study selection criteria. An integrative review is a tailored approach to reviewing existing healthcare evidence that allows for the combination of diverse methodologies and has the

potential to generate a comprehensive understanding, based on separate research findings (Kemppainen et al., 2013; Kirkevold, 1997; Whittemore & Knafl, 2005). Therefore, this study aimed to undertake an integrative review to investigate the effectiveness of health related waiting room interventions for promoting healthy lifestyle behaviours.

Methods

The integrative review was conducted according to established guidelines for undertaking integrative reviews and encompassed five phases: problem identification, literature search, data evaluation, data analysis and presentation of results (Kemppainen et al., 2013; Whitemore & Knafl, 2005). All applicable items from the PRISMA guidelines for reporting of reviews were included (Moher et al., 2009).

Search Strategy

A literature search was conducted using ScienceDirect, ProQuest Family Health, ProQuest, Scopus, PubMed, MEDLINE®, CINAHL, Dentistry and Oral Sciences and Cochrane databases. The following search terms and Medical Subject Headings (MeSH) were used to identify all relevant peer-reviewed publications: outpatients, outpatient setting, outpatient care, ambulatory care, ambulatory care facilities, primary care, primary health care, general practice, primary practice, health clinic, clinic, emergency department, emergency room, waiting room, waiting area, health, lifestyle, education, promotion, intervention, and information.

Diverse intervention methodologies and designs were included to enhance a holistic understanding of the topic of interest (Kemppainen et al., 2013; Whitemore & Knafl, 2005). In order to maximise the likelihood of identifying relevant studies, no limitation was applied regarding the year of publication or length of study. Cross-matching reference lists and forward citation searching was conducted in order to identify additional studies for consideration. A health-focused librarian provided support at each stage of the review process to further enhance search quality.

Study Selection

The study selection process is illustrated in Figure 1. Studies that investigated the effectiveness of health related information provided in primary health care waiting rooms on promoting healthy lifestyle behaviours were included in the review.

Specific inclusion criteria encompassed the following:

1. The setting under investigation must have been the waiting room of a primary health care setting, including general practices, allied health service clinics, sexual health clinics, hospital outpatient clinics and emergency rooms. Other settings such as inpatient setting, consultation rooms or wards were not included.
2. The provision of health related information must have been exclusively in the waiting room area of the outpatient setting. Studies investigating health related information outside of the waiting area, for example mail out information, were not included.
3. Participants in the intervention and/or control group must have had the opportunity to receive passive health related information, for example a pamphlet, poster, or video. Person-initiated or person-delivered interventions were not included.
4. The information delivered needed to be related to health, for example, chronic disease or illness, routine health check ups, general health and well being, immunization and sexual health. Information not relating to health, for example administrative information, were not included.
5. The study needed to include at least one outcome measure related to healthy lifestyle behaviours, for example actual health behaviours or knowledge, attitudes or intentions related to a health condition or behaviour. Studies

focusing on patient satisfaction or health professional opinion were not included.

[Insert Figure 1 here]

Data Extraction

Articles for inclusion were selected independently by two researchers (SC and LB) using the same search strategy and differences in selections were discussed prior to reaching final consensus. After careful review of each manuscript (SC), included studies were tabulated in chronological order under the following headings: author/s, country, publication year, aim, data collection methods, sample size, setting, intervention mode, key findings and limitations.

Quality Assessment

The quality of each study design and its suitability for assessing effectiveness was carried out independently by two researchers (SC and LB) using a pre-existing guide for quantitative and qualitative interventions in public health (Kennelly, 2011). The guide incorporates an adaption of the Methodological Quality Checklist (Downs & Black, 1998) for quantitative studies and covers the domains of reporting, external validity, internal validity (bias and confounding), and power. The guide also includes a checklist for qualitative studies adapted from previous tools and covers the domains of research design, sampling, data collection and analysis, findings and research value (Kennelly, 2011).

Data Synthesis

A standardised table was developed to compare the findings of each study (Torraco, 2004, 2005). Both quantitative and qualitative characteristics in the studies were given equal significance. Study aims and outcome measures were used to identify areas of focus for further analysis. Each area of focus was synthesised, analysed and presented separately.

Results

Overview

Of the 9,205 studies originally identified, 33 publications were included in the review. Studies were published from 1975 to 2014 inclusive, with 20 out of the 33 publications in the past decade. Participant sample sizes ranged from 9 to 40,684, with patients forming the largest proportion of participants across all studies. Four areas of focus emerged from the reviewed studies; knowledge about a health condition or behaviour (n=15), attitudes and intentions towards a health condition or behaviour (n=10), health care use and interactions (n=9) and health-related behaviours (n=14). Further characteristics of included studies can be found in Table 1.

[Insert Table 1 here]

Knowledge about a Health Condition or Behaviour

Fifteen studies investigated the effectiveness of health related information at increasing knowledge about a health condition or behaviour (see Table 2). All studies had a patient education focus and health topics included stroke, prenatal care, nutrition, physical activity, diabetic self-management, depression, contraception, sexually transmitted diseases and asthma. Of the 15 studies, four measured participants' knowledge only after intervention exposure (Gliori et al., 2006; Mathews et al., 1999; Moerenhout et al., 2013; Williams & Bethea, 2011), three measured participants' knowledge before and after intervention exposure (Chan et al., 2008; Cohen, 1983; Gilliam et al., 2014), and nine measured participants' knowledge in an intervention group compared to a control group (Cohen, 1983; Dhawan et al., 2008; Freda et al., 1994; Hogg et al., 2000; Jackson et al., 2010; Krishna et al., 2003; Maor

et al., 2011; Mathews et al., 2002; Sanghavi, 2005). Of the studies that compared participants' knowledge before and after intervention exposure or between intervention and control groups, ten of the eleven studies suggested participants' knowledge improved after being exposed to the intervention (Chan et al., 2008; Cohen, 1983; Dhawan et al., 2008; Freda et al., 1994; Gilliam et al., 2014; Hogg et al., 2000; Jackson et al., 2010; Krishna et al., 2003; Maor et al., 2011; Sanghavi, 2005). Additionally, one study assessed knowledge retention one month after intervention exposure and found that participants' knowledge remained significantly higher than the control group (Chan et al., 2008).

[Insert Table 2 here]

Attitudes and Intentions Toward a Health Condition or Behaviour

Ten studies investigated the effectiveness of health related information at improving attitudes and intentions toward a health condition or behaviour (see Table 3). Health topics included immunization, lifestyle behaviours, nutrition, alcohol abuse, physical activity, diabetes self-management, antibiotic use, sexually transmitted diseases and violence management. Six studies included outcome measures related to participants' attitudes about a health condition or behaviour. Of these six studies, two measured attitudes only after intervention exposure (Lawless et al., 2005; Scholer et al., 2008), one measured attitudes before and after intervention exposure (Stephens et al., 2008), and three measured participants' attitudes in an intervention group compared to a control group (Gerber et al., 2005; Maor et al., 2011; Mathews et al., 2002). One study showed improvements in attitudes post intervention (Mathews et al., 2002), two included a single time measure that showed some aspect of positive attitude (Maor et

al., 2011; Scholer et al., 2008) and three showed no change in attitudes post intervention (Gerber et al., 2005; Lawless et al., 2005; Stephens et al., 2008).

Four studies included outcome measures of intentions toward health behaviour. Of these, three measured intentions only after intervention exposure (Ellis et al., 1982; Frank et al., 2000; Rose et al., 2010), one measured intentions before and after intervention exposure (Giordano et al., 2013), and there were no studies that measured participants' intentions in an intervention group compared to a control group.

Between 25-97% of participants indicated intent to modify behaviour as a result of the intervention across three studies (Ellis et al., 1982; Frank et al., 2000; Rose et al., 2010) whilst one study reported no change in intentions post intervention (Giordano et al., 2013).

[Insert Table 3 here]

Health Care Use

Nine studies investigated the effectiveness of health related information on health care use, namely patient-professional interactions (see Table 4). Three studies included outcomes measures related to intended interactions with health professionals (Gilliam et al., 2014; Goldschmidt & Goodrich, 2004; Scholer et al., 2008). Two of these studies reported a positive influence of the intervention on patients' health care use intentions (Goldschmidt & Goodrich, 2004; Scholer et al., 2008) and one reported a positive influence of the intervention on patients' interest to interact with health professionals (Gilliam et al., 2014). Six studies included outcomes measures related to actual interactions with health professionals after the intervention (Jackson et al.,

2010; Krishna et al., 2003; Moerenhout et al., 2013; Padfield et al., 2010; Rose et al., 2010; Stephens et al., 2008), with five reporting positive effects on health care utilisation (Jackson et al., 2010; Krishna et al., 2003; Moerenhout et al., 2013; Padfield et al., 2010; Rose et al., 2010). The single study (Stephens et al., 2008) that reported the intervention did not significantly affect patient-physician information exchange utilised a 5-day intervention phase which may not have been sufficient in length to identify changes in health care utilisation.

[Insert Table 4 here]

Health Related Behaviours

Fourteen studies investigated the effectiveness of health related information on health related behaviours (see Table 5). Targeted behaviours included preventive screening and vaccinations as well as behaviours such as smoking, dietary intake and physical activity. The studies reported improvements in participants' health related behaviours with a range of 0.79-44% of participants modifying behaviour as a result of the intervention (Cotter & Wilson, 1975; Eubelen et al., 2011; Gliori et al., 2006; Goldschmidt & Goodrich, 2004; Jackson et al., 2010; Janda et al., 2002; Krishna et al., 2003; Leijon et al., 2011; Rose et al., 2010; Yancey et al., 1995). Although favourable improvements are reported, the clinical significance of the improvement was not often considered (Cotter & Wilson, 1975; Giordano et al., 2013; Mead et al., 1995).

[Insert Table 4 here]

Quality Assessment

The quality attributes of each study are displayed in Table 6. Seven of the 30 studies were assessed to have both good quality rating and the greatest suitability rating (Chan et al., 2008; Dhawan et al., 2008; Gerber et al., 2005; Gilliam et al., 2014; Jackson et al., 2010; Janda et al., 2002; Krishna et al., 2003). Six of these seven studies found positive results in the four outcome areas (Chan et al., 2008; Dhawan et al., 2008; Gilliam et al., 2014; Jackson et al., 2010; Janda et al., 2002; Krishna et al., 2003). Due to descriptive nature of some studies, parts of the assessment checklists were unable to be determined, affecting the total quality score of these studies. The main reasons for not achieving a positive quality rating were lack of power calculation for sample size and lack of randomisation of participants to intervention and control groups.

[Insert Table 6 here]

Discussion

This integrative review investigated the effectiveness of passive interventions in primary health care waiting rooms on promoting healthy lifestyle behaviours. Most of the reviewed studies revealed that passive interventions had a general positive influence on knowledge, intentions, health care use and behaviours regarding the topic. Variable outcomes were reported regarding attitude towards a health topic. Few studies were assessed as high quality and highest suitability to assess effectiveness of interventions; therefore overall results must be interpreted with caution.

Overall, the reviewed studies suggest that participants' knowledge immediately improved after being exposed to passive health related interventions. Improvements in knowledge were evident across various intervention modes, health topics and waiting room settings. However, only one study measured knowledge retention (1 month post intervention) (Chan et al., 2008), which limits understanding of longer-term impacts of these interventions on knowledge and subsequent behaviours or health outcomes. These improvements are promising, as knowledge has been significantly associated with healthy lifestyle behaviours (Wardle et al., 2000; Worsley A, 2002). For example, high levels of food and nutrition knowledge are associated with positive nutrition behaviours such as reading nutrition information panels on food products and healthy dietary intake (Wardle et al., 2000; Worsley, 2002). However, in the reviewed studies knowledge was often measured as immediate recall of material contents via purposively developed and non-validated short multiple choice items. Therefore, the apparent improvements in knowledge may not reflect a deeper understanding of a health topic. Future studies are recommended to utilise validated knowledge assessment tools as well as explore possible long-term impacts of these

interventions.

The reviewed studies suggest that participants' intentions toward health behaviour are generally enhanced after being exposed to passive health related interventions. In contrast to this, inconsistent results were reported regarding participants' attitudes toward a health topic. Attitudes towards health have been shown to influence healthy lifestyle behaviours (Baranowski et al., 1999) and are therefore an important consideration for interventions. The variability in results in the reviewed studies could suggest that primary health care waiting rooms may not be an ideal environment for improving attitudes toward health behaviours. Alternatively, the methodological design and data collection measures may not have been appropriate to identify change in attitudes. For example, one study involved a five-day intervention which may be an insufficient period to determine significant change (Stephens et al., 2008).

Furthermore, the authors of this study suggest their null findings could be due to an unacceptable intervention (poster), however no pilot data was collected to investigate this (Stephens et al., 2008). Another study lacked pre-testing measures of attitude which limited capacity to measure changes over time (Lawless et al., 2005).

Therefore, further research using improved methodological design and collection of outcome measures is required before conclusions may be drawn regarding the effect of passive interventions on attitudes towards a health topic.

Participants' intent to utilise health care and actual health care use generally increased after exposure to interventions in the reviewed studies. For example, one study revealed that 86% of participants' interacted with their health professional regarding the topic after intervention exposure (Padfield et al., 2010), whilst 79% of participants

in another study were more willing to discuss the topic with their health professional after intervention exposure (Scholer et al., 2008). However, increases in health care utilisation may not always reflect the intended outcome of an intervention; as a decrease in health care use may also reflect positive outcome. For example, one study revealed that patients asked health professionals fewer questions after being exposed to an intervention in the waiting room (Moerenhout et al., 2013). This finding may reflect an increase in understanding of a health topic, or alternatively, a false perception of having sufficient knowledge and not requiring further health care. The quality of the actual health care received after waiting room interventions is likely to be variable (Ashby et al., 2012; Ball et al., 2013). Therefore, the apparent increase in health care interactions may not ensure an improvement in quality, outcome or usefulness of overall health care. Ideally, studies investigating health care interactions should also explore subsequent outcomes of patient-physician interactions.

Overall, the reviewed studies suggest that participants' health related behaviours are generally improved after being exposed to passive health related interventions. Although favourable improvements in behaviour modification are reported, the degree to which an improvement is seen is questionable (Cotter & Wilson, 1975; Giordano et al., 2013; Mead et al., 1995) as it remains unclear whether the reported improvements reflect a meaningful improvement in clinical outcomes. For example, one study reported 2.8% of participants to behave in line with immunization guidelines after intervention exposure (Cotter & Wilson, 1975). However, this study only measured behaviour during the intervention period, and did not compare this to a usual immunization rates in the clinic; therefore the actual behaviour change

improvement remains unclear. Another study focussed on health checks and screens, however only 5% of the clinic patient population were eligible to participate (Mead et al., 1995). It is therefore unclear how meaningful the results of this intervention are on a broader scale. Due to the complexity of behaviour change (Michie et al., 2009; Michie et al., 2005), it may be argued that any degree of behaviour change, for example 0.79% of the study population (Eubelen et al., 2011), could be a positive outcome at population level. Consideration of the clinical significance of the cost-effectiveness of improvements is warranted prior to implementation of future interventions

Interventions that exclusively focus on a single domain, such as knowledge, often fail to achieve sustainable results in terms of behaviour change (Catania et al., 1990; Nutbeam, 2006). Multifaceted approaches that incorporate components such as knowledge, awareness, attitudes and subsequent intentions are viewed as essential to behaviour change, particularly in behaviour change models, for example the Theory of Planned Behaviour (Ajzen, 2011; Conner & Norman, 2005; Nutbeam, 2006).

While passive interventions might have some short-term impact on knowledge, attitudes, intention and behaviour, it is unclear whether these improvements are generally sustained. Behaviour change and subsequent changes in patterns of disease is likely to require multiple interventions that extend across a downstream, midstream and upstream level. Furthermore, health interventions often seek to change individual and population knowledge, attitudes and behaviours related to health (Halpern et al., 2004). Interventions that utilise a theoretical approach to planning often result in more effective outcomes (Ellis & Grey, 2003; Jepson, 2000; Roe et al., 1997; Swann et al., 2003). Furthermore, the reviewed interventions that saw an improvement in a single

domain, for example knowledge, may have also improved other components of behaviour change that were not investigated. Therefore, further research that incorporates measures of additional or all components of behaviour change models may assist to better understand the mechanism of any improvement observed.

Based on the results from this review, it remains unclear which factors (such as mode and duration of intervention) facilitate the most effective outcomes in behaviour change. Few studies were assessed as high quality and highest suitability to assess effectiveness of interventions; therefore study design elements need to be addressed in future interventions. In addition, the quality of the intervention materials (such as the design and extent of appeal) was not discussed in any study. Future studies should logically ensure that materials accessed by patients are appealing and well designed, which warrants pre-intervention piloting for feedback on these aspects of the intervention.

Many of the reviewed studies had post-intervention measures only, therefore it was not always possible to confirm the effectiveness of intervention compared to baseline. Study designs that encompass intervention and control groups with concurrent data collection time periods are recommended; such as a cluster randomised control trial in primary health care settings. Additionally, the consideration of precursors to behaviour change, that are measured using valid and reliable tools are recommended. A further recommendation is adequate planning for follow-up of participants after intervention exposure. For example, one of the reviewed studies was not able to actively track patients to complete the post-intervention survey and therefore, was not able to obtain complete data on a substantial portion of intervention participants,

limiting statistical analysis (Giordano et al., 2013).

Conclusion

Overall, the reviewed studies suggest that passive interventions in primary health care waiting rooms have a general positive influence on participants' knowledge, intentions, health care use and behaviours. Variable outcomes were reported regarding attitude towards a health topic, and the quality of all reviewed studies were variable. Further research with strong methodological design is recommended, as this approach to health promotion has the potential to contribute to the priority area of promoting healthy lifestyle behaviours within primary health care.

Conflicts of Interest

None declared.

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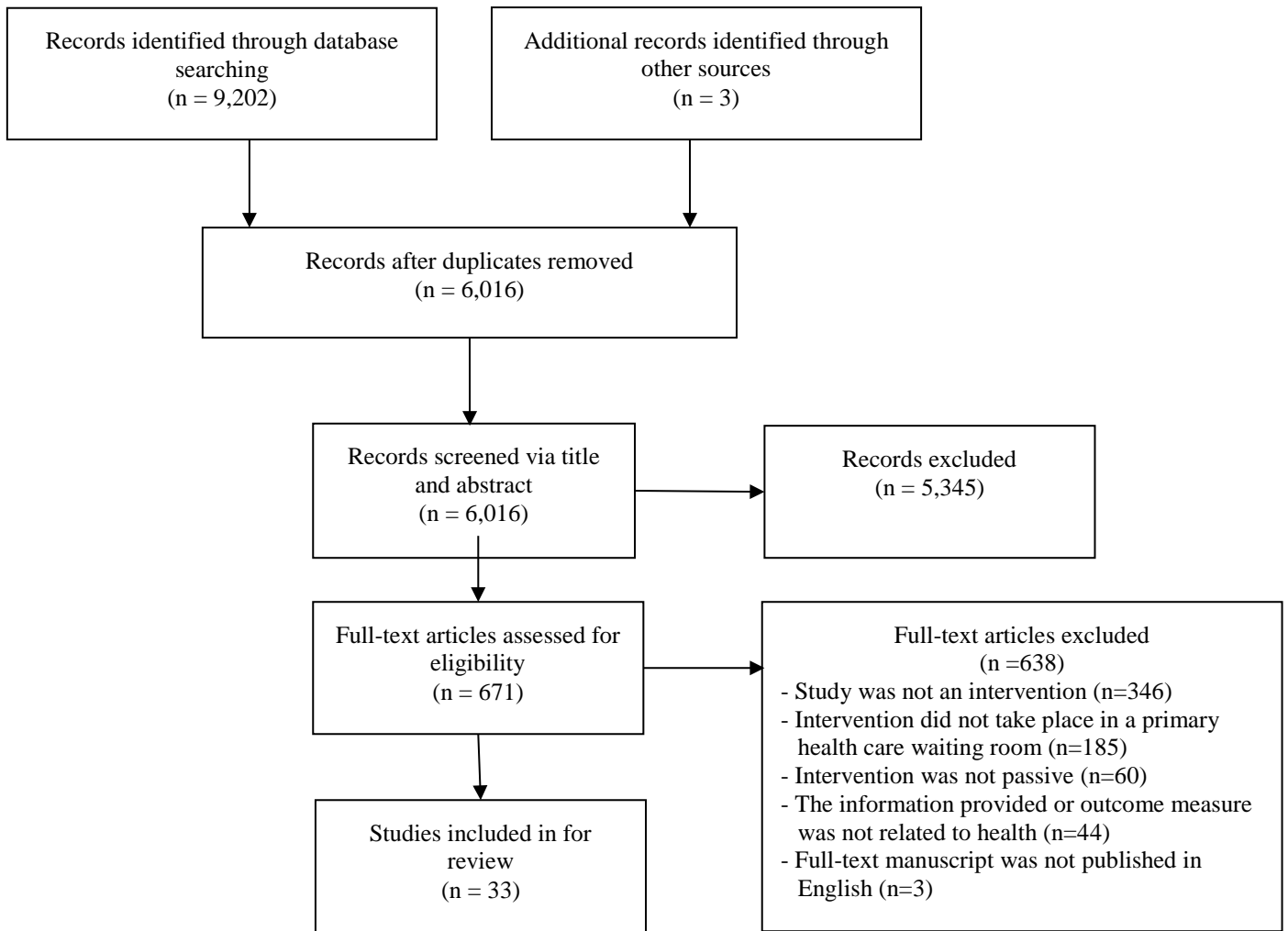
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Figure 1: Flowchart of study selection.



1

Table 1: Characteristics of studies included in integrative review (n=33).

Characteristics	Number (n)	
Country of origin	USA	21
	UK	4
	Belgium	2
	South Africa	2
	Austria	1
	India	1
	Israel	1
	Sweden	1
Waiting room setting	General practice	13
	Prenatal/family planning clinics	7
	Paediatric clinics	5
	Emergency departments	2
	Diabetes clinic	1
	Dental clinic	1
	Public health clinic	1
	Sexual health clinic	1
	Pain management clinic	1
	General outpatient clinic	1
Intervention mode*	Video	14
	Poster	10
	Kiosk/computer	8
	Brochure	6
	Photos	2
	Recorded audio message	2
	App	1
	Worksheets	1
	Fact cards	1
	Voice recognition telephone	1
	Merchandise	1

2

*Of the 33 studies, 11 studies utilised more than one intervention mode therefore n>33.

Table 2: Characteristics of studies that investigated effectiveness of health related information at increasing knowledge about a health condition or behaviour (n=15).

Study details	Patient education topic	Setting and intervention mode	Intervention protocol	Findings
(Gilliam et al., 2014) USA	Long acting reversible contraception	Tablet app in family planning clinic WR	Intervention (n=28) and control (n=24) groups. Knowledge was measured via survey at baseline (intervention and control) and post- intervention (intervention group only).	There was no difference in knowledge between groups at baseline (p=0.83). Participants in the intervention group improved knowledge after intervention exposure (p=0.0001).
(Moerenhout et al., 2013) Belgium	Health and self management	Brochures in GP WR	Single group (n=903). Self perceived improvement in knowledge was measured via survey post- intervention only.	34% participants agreed that the intervention helped to improve their knowledge, 41% were neutral, and 13% did not agree.
(Maor et al., 2011) Isreal	Antibiotic treatment	Posters and brochures in paediatric clinic WR	Intervention (n=688) and control (n=868) groups. Knowledge was measured via survey post- intervention only (intervention and control).	Participants in the intervention group had higher knowledge compared to participants in the control group (p<0.001) after intervention exposure.
(Williams & Bethea, 2011) UK	Oral cancer	Poster and leaflet in dental clinic WR	Single group (n=9). Self perceived improvement in knowledge was explored via interview post- intervention only.	Overall knowledge about the disease was limited and remained poor after intervention exposure. Few felt that they knew the signs and symptoms of the condition.
(Jackson et al., 2010) USA	Diet and exercise for pregnancy	Video and worksheet in prenatal care WR	Intervention (n=134) and control (n=153) groups. Knowledge was measured via survey at baseline (intervention and control) and 4 weeks post- intervention (intervention and control).	There was no difference in knowledge between groups at baseline (p=0.52). Participants in the intervention group improved knowledge after intervention exposure more than participants in control group (p=0.009).
(Chan et al., 2008) USA	Stroke	Video in ED WR	Intervention (n=98) and control (n=100) groups. Knowledge was measured via survey pre- (intervention and control), immediately post- (intervention group only), and 1-month post- intervention (intervention and control).	There was no difference in knowledge between groups at baseline (p>0.05). Participants in the intervention group had higher knowledge immediately post- and 1-month post- intervention exposure compared with baseline (p<0.01). Participants in the intervention group had higher knowledge than participants in the control group 1-month after intervention exposure (p<0.05).
(Dhawan et al., 2008) India	Myocardial infarction	Video in ED WR	Intervention (n=111) and control (n=106) group. Knowledge was measured via survey pre- (intervention and control) and post- intervention (intervention and control).	There was no difference in knowledge between groups at baseline (p>0.19). Participants in the intervention group had higher knowledge than participants in the control group post- intervention exposure (p<0.001).
(Gliori et al., 2006) USA	Fish intake for pregnancy	Posters, brochures and fact cards in prenatal care WR	Single group (n=726). Self perceived knowledge was measured via survey post- intervention only.	3% participants reported to know 'a lot', 27% knew 'something', 32% knew 'only a little', and 35% knew 'nothing' about the topic after intervention exposure.
(Sanghavi, 2005) USA	Child health	Kiosk in paediatric clinic WR	Intervention (n=49) and control (n=52) groups. Knowledge was measure via survey post- intervention	Participants in the intervention group had higher knowledge than participants in the control group for 3 of

			only (intervention and control).	the 5 topics (p<0.01) after intervention exposure.
(Krishna et al., 2003) USA	Asthma	Computer in paediatric clinic WR	Intervention (n=119) and control (n=127) groups. Knowledge was measured via survey at baseline (intervention and control), 3-month post- (intervention and control) and 12-month post- intervention (intervention and control).	Participants in the intervention group had higher knowledge than participants in the control group (p<0.01) at all time points after intervention exposure.
(Mathews et al., 2002) SA	Sexually transmitted diseases	Video in public health clinic WR	Intervention (n=185) and control (n=150) groups. Knowledge was measured via survey pre- intervention (control group) and post- intervention (intervention group).	There was no difference in knowledge between participants in the intervention group and participants in the control group (p>0.09) after intervention exposure.
(Hogg et al., 2000) UK	Obstetric ultrasound needs	Computer and leaflets in obstetric WR	Intervention (n=710) and control (n=1354) groups. Knowledge was measured via survey pre-, during, and post- intervention.	44% of participants answered all knowledge questions correctly before intervention exposure and 59% of participants answered all knowledge questions correctly after intervention exposure. No further analyses were conducted.
(Mathews et al., 1999) SA	Sexually transmitted diseases	Video in GP WR	Single group (n=187). Knowledge was explored via interview post- intervention only.	73% of participants reported that exposure to the intervention increased their knowledge.
(Freda et al., 1994) USA	Prenatal care	Video in prenatal care WR	Intervention (n=129) and control (n=127) groups. Knowledge was measured via survey post-intervention only (control and intervention).	Participants in the intervention group had higher knowledge than participants in the control group (p=0.01) after intervention exposure.
(Cohen, 1983) USA	Depression	Video in GP WR	Single group (n=unspecified). Knowledge was measured via survey pre- and post- intervention.	Participants' total knowledge improved after intervention exposure (p=0.002).

ED = emergency department, GP = general practice, SA = South Africa, UK = United Kingdom, USA = United States of America, WR = waiting room

Table 3: Characteristics of studies that investigated effectiveness of health related information at enhancing attitudes and intentions toward a health condition or behaviour (n=10)

Study details	Topic of focus	Setting and intervention mode	Intervention protocol	Findings
(Giordano et al., 2013) USA	Intention toward antiretroviral therapy	Video and merchandise in sexual health clinic WR	Single group (n=141). Self reported intention was measured via survey pre- and post-intervention.	Participants' intent to modify behaviour did not change (p=0.41) after intervention exposure.
(Maor et al., 2011) Israel	Attitude toward antibiotic use	Posters and brochures in paediatric clinic WR	Intervention (n=688) and control (n=868) groups. Attitude was measured via survey post-intervention only (intervention and control).	Participants in the intervention group had stronger attitudes toward topic compared to participants in the control group (p=0.002) after intervention exposure.
(Rose et al., 2010) USA	Intentions toward alcohol consumption	Voice recognition telephone in GP WR	Single group (n=30). Intention was measured via interview at 1 week post- and 2 weeks post-intervention.	40% of participants were motivated to modify their behaviour, with 24% of participants indicating they were interested in modifying their behaviour relating to the topic after intervention exposure.
(Scholer et al., 2008) USA	Attitude toward violence management	Video in paediatric clinic WR	Two groups received same intervention in WR (n=54) and consult (n=35). Attitude was measured via interview post-intervention.	98% of participants (WR group) felt more comfortable toward topic after intervention exposure.
(Stephens et al., 2008) USA	Attitude toward weight loss	Poster in GP WR	Single group (n=669). Attitude was measured via survey pre- (n=283) and post- (n=386) intervention.	There was no difference in attitude toward topic between participants in the pre- and post-intervention group (p=0.63) after intervention exposure.
(Gerber et al., 2005) USA	Attitude toward diabetes self management	Kiosk in general outpatient WR	Intervention (n=94) and control (n=89) groups. Attitude was measured survey during interviews 1-year post-intervention.	Participants in the intervention group showed no difference in self-efficacy after intervention exposure, compared with the control group (p>0.05).
(Lawless et al., 2005) USA	Attitude toward diabetes self management	Kiosk in diabetes outpatient WR	Single group (n=56). Attitude was measured via telephone survey at 3 time points, immediately post- (n=56), 3-month post- (n=34) and 6-month post- (n=30) intervention.	There was no difference in attitude toward topic after intervention exposure (p=>0.05).
(Mathews et al., 2002) SA	Attitude toward sexually health behaviour	Video in public health clinic WR	Intervention (n=185) and control (n=150) groups. Attitude was measured via survey pre-intervention (control group) and post-intervention (intervention group).	Participants in the intervention group had more positive attitudes than participants in the control group for 1 of the 3 indicators of attitude (p=0.02) after intervention exposure.
(Frank et al., 2000) USA	Intentions toward lifestyle habits	Video in GP WR	Two intervention groups (n=66 and n=65) with slightly varied content. Self reported intention was measured via survey post-intervention.	Participants were motivated or encouraged to have healthy habits (97% and 94%, p=0.001), to have a healthy diet (94% and 94%, p=0.006) and to exercise (94% and 92%, p=0.001) after intervention exposure across both groups.
(L. Ellis et al.,	Intentions toward	Computer and	Single group (n=1387). Self reported intention	Participants indicated they would modify an aspect of their behaviour

1982) USA	healthy lifestyle habits	poster in GP WR	was measured via survey post- intervention.	related to smoking (35%, $p<0.01$), exercise and weight (38%, $p<0.05$) life expectancy (25%, $p<0.01$) and life-style (32%, $p<0.001$) after intervention exposure.
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GP = general practice, SA = South Africa, UK = United Kingdom, USA = United States of America, WR = waiting room

Table 4: Characteristics of studies that investigated effectiveness of health related information at enhancing health care use (n=9).

Study details	Topic of focus	Setting and intervention mode	Intervention protocol	Findings
(Gilliam et al., 2014) USA	Long acting reversible contraception	Tablet app in family planning clinic WR	Intervention (n=28) and control (n=24) groups. Interest in discussing topic with HP was measured at baseline (intervention and control) and post- intervention (intervention group only).	There was no difference in interest between groups at baseline (p=0.96). Participants in the intervention group were more interested in discussing one of the two health topics (p=0.02) compared with participants in the control group.
(Moerenhout et al., 2013) Belgium	Health and self management	Leaflet in GP WR	Single group (n=903). Self-reported interactions were measured post- intervention.	26% participants agreed that the intervention helped to ask HPs fewer questions, 31% were neutral, and 32% did not agree.
(Jackson et al., 2010) USA	Diet and exercise for pregnancy	Video and worksheet in prenatal care WR	Intervention (n=134) and control (n=153) groups. Actual interactions with HP were measured via survey immediately post- (intervention and control) and 4 weeks post- intervention (intervention and control).	More participants in the intervention group than control group discussed topics with HPs immediately after intervention exposure (p<0.001) and 4 weeks after intervention exposure (p<0.003).
(Padfield et al., 2010) UK	Pain management	Photos in pain clinic WR	Single group of patient (n=64) and health professional (n=64) pairs. Actual patient-physician interactions were measured via survey post- intervention.	86% of patients interacted with HP regarding topic after intervention exposure, with 82% of HPs reporting improved communication due to intervention.
(Rose et al., 2010) USA	Alcohol consumption	Voice recognition telephone in GP WR	Single group (n=30). Self reported interactions were measured via interview at 1 week post- and 2 weeks post- intervention.	45% of participants stated they had discussed the topic with HP after intervention exposure.
(Scholer et al., 2008) USA	Violence prevention	Video in paediatric clinic WR	Two groups received same intervention in WR (n=54) and consult (n=35). Interest in discussing topic with HP was measured via interview post- intervention.	79% of participants were more willing to discuss topic with HP (WR group) after exposure to intervention.
(Stephens et al., 2008) USA	Weight loss	Poster in GP WR	Single group (n=669). Self reported interaction with HP was measure via survey pre- (n=283) and post- (n=386) intervention.	There was no difference in patient-physician interactions between participants in the pre- and post-intervention group (p=0.59) after intervention exposure.
(Goldschmidt & Goodrich, 2004) USA	Various health conditions, medications, treatments and management	Kiosk in GP WR	Single group (n=2878). Likelihood of interacting with HP was measured via survey post- intervention.	82% of participants stated positive likelihood of following HP advice relating to the topic after intervention exposure.
(Krishna et al., 2003) USA	Asthma management	Computer in paediatric clinic WR	Intervention (n=119) and control (n=127) groups. Actual interactions with HP were measured via survey at baseline (intervention and control), 3-month post-	Participants in the intervention group reported less emergency room visits than participants in control group (p<0.05).

(intervention and control) and 12-month post-
intervention (intervention and control).

GP = general practice, HP = health professional, UK = United Kingdom, USA = United States of America, WR = waiting room.

Table 5: Characteristics of studies that investigated effectiveness of health related information at improving health related behaviours (n=14).

Study details	Patient information topic	Setting and intervention mode	Intervention protocol	Findings
(Giordano et al., 2013) USA	Antiretroviral therapy for HIV infection	Video and merchandise in sexual health clinic WR	Single group (n=141). Self reported behaviour was measured via survey pre- and post- intervention.	Participants' self reported behaviour related to the topic did not improve (p=0.39) after intervention exposure.
(Eubelen et al., 2011) Belgium	Tetanus booster vaccination	Audio message in GP WR	Intervention (n=23,317) and control (n=17,367) groups. Behaviour was measured via medical record assessment pre- and post- intervention (intervention and control).	Participants in the intervention group improved behaviour (0.79%, p=0.0005), whilst participants in the control group remained the same (p=0.90) after intervention exposure. Overall, behaviour change comparison between the intervention and control group differed (0.79 vs 0.39%, p<0.0001).
(Leijon et al., 2011) Sweden	Physical activity promotion	Kiosk and poster in GP WR	Single group (n=311). Self reported behaviour was measured via survey at baseline and 3-month post intervention.	Participants' behaviour improved from baseline (0% sufficiently active) to 3 months after intervention exposure (44% sufficiently active).
(Jackson et al., 2010) USA	Dietary intake and exercise for pregnancy	Video and worksheet in prenatal care WR	Intervention (n=134) and control (n=153) groups. Behaviour modification was measured via survey at baseline (intervention and control) and 4 weeks post-intervention (intervention and control).	Participants in the intervention group improved PA behaviour (p<0.05), dietary intake (p<0.05) 4 weeks after intervention exposure. Participants in the intervention group had healthier dietary intake compared with participants in control group (p<0.05). There was no difference between participants in the intervention and control groups for PA behaviour 4 weeks after intervention exposure (p>0.05).
(Rose et al., 2010) USA	Alcohol consumption	Voice recognition telephone in GP WR	Single group (n=30). Self reported behaviours were measured via interview at 1 week post- and 2 weeks post- intervention.	42% reduction was seen amongst patients in health behaviour after intervention exposure (p=0.40).
(Ashe et al., 2006) USA	Antibiotic use	Poster in paediatric clinic WR	Intervention (n=360) and control (n=360). Behaviours were measured via medical record audit across 4 separate study months (1 group only had intervention exposure).	Participants' behaviour related to the topic did not improve (p=0.79) after intervention exposure.
(Gliori G et al., 2006) USA	Fish consumption for pregnancy	Posters, brochures and fact cards in prenatal care WR	Single group (n=726). Behaviour change was reported via survey post- intervention only.	38% participants reported to change their behaviour and 62% reported no behaviour change after intervention exposure.
(Goldschmidt & Goodrich, 2004) USA	Various health conditions, including flu vaccination	Kiosk in GP WR	Single group (n=2878). Behaviour was measured via medical record assessment at pre-, 1-year post-, 2-years post and 3-years post- intervention time points.	An increase in behaviour was seen at 1-year (24%), 2-years (42%) and 3-years (44%) after intervention exposure amongst participants.
(Krishna et al.,	Asthma management	Computer in	Intervention (n=119) and control (n=127) groups.	Participants in the intervention group improved

2003) USA		paediatric clinic WR	Behaviour modification was measured via survey at baseline (intervention and control), 3-month post- (intervention and control) and 12-month post-intervention (intervention and control).	behaviour (required less medication) more than participants in the control group ($p < 0.01$) after intervention exposure.
(Janda et al., 2002) Austria	Breast screen examinations	Video in family planning clinic WR	Intervention (n=108) and control (n=111) groups. Self-reported behaviour was measured via survey pre- and 3-month post- intervention (intervention and control).	Participants improved behaviour from baseline to 3-month follow up in both groups ($p < 0.001$) with participants in the intervention group improving behaviour more than participants in the control group ($p = 0.02$) after intervention exposure.
(Mead et al., 1995) USA	Preventative service utilisation	Video, poster, brochures in GP WR	Intervention (n=389) and control (n=381) groups. Behaviour was measured via medical records immediately post- (control and intervention) and 4-month post intervention (control and intervention).	Participants' behaviour related to the topic did not change after intervention exposure.
(Yancey et al., 1995) USA	Cervical cancer screening	Video in GP WR	Intervention (n=868) and control (n=876) groups. Behaviour was measured via medical records post-intervention (intervention and control).	Participants in the intervention group improved behaviour more than participants in the control group ($p < 0.05$) after intervention exposure.
(Li et al., 1984) USA	Smoking cessation	Video and poster in family planning clinic WR	Intervention (n=330) and control (n=347) groups. Behaviour was measured via survey or interview at baseline, 3-month post- and 12-month post-intervention (intervention and control).	Participants' in the intervention group did not improve behaviour after intervention exposure compared to the control group ($p > 0.05$).
(Cotter & Wilson, 1975) UK	Immunization	Poster, photos and recorded audio message in GP WR	Single group (n=350). Behaviour was measured via medical record audit post- intervention	2.8% participants behaved according to prompts after intervention exposure

GP = general practice, UK = United Kingdom, USA = United States of America, WR = waiting room

Table 6: Quality assessment of quantitative and qualitative studies included in the review (n=33).

Quantitative studies								
Author (year)	Reporting	External validity	Internal validity-bias	Internal validity-confounding	Power	Total quality score	Quality rating (<14 = poor, 15-19 = fair, >20 = good)	Suitability of study to assess effectiveness
Gilliam (2014)	8	4	6	4	1	23	Good	Greatest
Gilori (2013)	6	3	2	1	-	12	Poor	Least
Moerenhout (2013)	7	4	2	2	-	15	Fair	Least
Eubelen (2011)	6	3	3	3	-	15	Fair	Greatest
Leijon (2011)	7	3	4	2	-	16	Fair	Greatest
Maor (2011)	9	3	4	2	-	18	Fair	Least
Jackson (2010)	11	4	4	4	-	23	Good	Greatest
Rose (2010)	9	3	6	3	-	21	Good	Least
Chan (2008)	9	2	5	4	-	20	Good	Greatest
Dhawan (2008)	10	4	6	4	-	24	Good	Greatest
Scholer (2008)	7	4	4	2	-	17	Fair	Greatest
Stephens (2008)	6	3	2	1	2	14	Poor	Moderate
Ashe (2006)	7	2	3	1	1	14	Poor	Moderate
Giordano (2006)	9	4	4	4	1	22	Good	Least
Gerber (2005)	11	4	6	3	1	25	Good	Greatest
Lawless (2005)	7	3	4	3	-	17	Fair	Least
Sanghavi (2005)	6	3	4	3	-	16	Fair	Greatest
Goldschmidt (2004)	4	1	2	1	-	8	Poor	Least
Krishna (2003)	10	4	3	4	1	22	Good	Greatest
Janda (2002)	10	4	5	3	-	22	Good	Greatest
Mathews (2002)	8	3	3	1	-	15	Fair	Least
Frank (2000)	8	2	4	3	-	17	Fair	Greatest
Hogg (2000)	5	3	3	1	-	12	Poor	Least
Mead (1995)	7	4	3	3	2	19	Fair	Greatest
Yancey (1995)	7	3	3	-	1	14	Poor	Moderate
Freda (1994)	8	3	3	3	2	19	Fair	Greatest
Li (1984)	6	4	4	4	-	18	Fair	Greatest
Cohen (1983)	6	3	4	3	-	16	Fair	Greatest
Ellis (1982)	6	2	1	2	-	11	Poor	Least
Cotter (1975)	6	-	2	2	-	10	Poor	Least
Qualitative studies								
Author (year)	Research design	Sampling	Data collection	Data analysis	Findings	Research value	Total sum of all domains	Overall quality value and suitability
Williams (2011)	3	2	2	4	5	5	21	High
Padfield (2010)	3	-	2	2	4	5	16	Fair
Mathews (2002)	3	-	2	-	5	5	15	High
Mathews (1999)	1	-	2	-	3	3	9	Low