

**EVALUATION OF A SCHOOL-BASED PEER-LED EDUCATION
PROGRAM FOR ADOLESCENTS WITH ASTHMA IN JORDAN**

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**A thesis submitted in accordance with the total requirements for admission to the
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Certificate Of Authorship/Originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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Abstract

Background: Adolescent asthma, despite being prevalent and having the potential to negatively impact quality of life, can be adequately managed using the support of peer-led education initiatives within the school context. Such programs acknowledge the social importance of peers and schools in shaping adolescents' health-related behaviours, utilising the universal influence of peers in a positive way.

Aim: The aim of this study was to determine the effect of a peer-led asthma education program (Triple A – Adolescent Asthma Action) on asthma-related quality of life, knowledge of asthma management, and self-efficacy to resist smoking among students with asthma attending high schools in Jordan by three months post intervention.

Methods: A cluster-randomised controlled trial was conducted in 4 high schools in Irbid, Jordan, on students with asthma ($n = 261$) in years 8, 9, and 10. Students in the two intervention schools ($n = 132$) were involved in TAJ (Triple A in Jordan) over three weeks, whereas students in the two control schools ($n = 129$) were not involved in any intervention. The trial followed a pilot study that was used to determine whether Triple A was needed and feasible, with adaptations made to adjust for the Jordanian high school context. As the cluster design was used and three baseline covariates were found, a SAS.PROC.MIXED adjusted model was used to account for these issues.

Results: The average age of the students with asthma was 15.2 years ($SD = 1.23$), and the majority were male (56.7%), with almost one third of all the participating students (27.7%) reporting being smokers. Approximately 70% had a professional asthma diagnosis, and the remainder reported recent wheezing in the last 12 months, but had not been diagnosed with asthma by a health care professional. In fact, the proportion of students with asthma in the whole sample proved larger than expected, as asthma symptoms were prevalent (17.15%). The program was well-received by students and school staff and modifications were minimal. The TAJ program resulted in significant improvement in all outcomes measured in students with asthma. Compared to the control group, students with asthma in the intervention schools had statistically and clinically significant improvements in quality of life (mean difference = 1.35, 95%

CI = 1.04 – 1.76), better asthma-related knowledge (mean difference = 1.62, 95% CI = 1.15 – 2.19), and higher self-efficacy to resist smoking (mean difference = 4.63, 95% CI = 2.93 – 6.35) at three months follow-up. In particular, the TAJ group had most improvement in quality of life in the symptom sub-domain scores (change in score = 0.97, $p < 0.02$) in comparison to the activities and the emotions domains.

Conclusion: The school-based peer-led education program (TAJ) has been shown to be successful in promoting the health of adolescents with asthma in Jordan. Triple A proved adaptable and effective in another culture and context and may have potential for other health-related issues for adolescents. It is crucial that health promotion programs like TAJ are implemented for adolescents in Jordan.

Prologue

Although asthma is a health problem for adolescents in Jordan, no published plans or guidelines exist for management of asthma in this critical period of any individual's life. This is partly due to the lack of research in this area, as well as the relatively small number of health care professionals or health promotion initiatives in Jordan. These issues make it even more important for adolescents to know how to manage asthma independently. Jordanian adolescents thus need to be educated about how to adequately manage their chronic condition and supported to encourage adherence and persistence with self-management tasks. This thesis details a cluster-randomised, controlled trial testing the effectiveness of an innovative peer-led asthma education program in high schools in Jordan. The aims of the intervention were to improve asthma related quality of life, knowledge of asthma and related management, and self-efficacy to resist smoking among students with asthma. This study was the first of its kind and took place in high schools in Jordan.

The intervention tested in this trial is an educational program called Triple A in Jordan (TAJ). TAJ was adapted from the Adolescent Asthma Action (Triple A) program through a process evaluation undertaken as part of this thesis. The Triple A Program was developed initially for Australian high school students by Dr. Shah in 1993 to improve asthma self-management in schools, and has since been trialled successfully in several rural and urban areas in Australia. Triple A has been found to produce positive changes in asthma-related quality of life, knowledge, and school absenteeism in adolescents with asthma, as well as the creation of a school culture that inhibits smoking. The program uses universal principles such as human agency, self-efficacy, and empowerment. Senior high school students are used as allies to educate their slightly younger peers about asthma and related self-management, with health professionals playing a lesser role.

My interest in trialling Triple A in Jordan was influenced by my professional experience there. Before arriving in Australia in 2003, I worked as a senior paediatric nurse and a university lecturer in Jordan from 1998 to 2003. Whilst working in children's hospitals, I saw many children and adolescents being admitted with an

exacerbation of asthma through the emergency room to seek treatment for their symptoms. Many had never been diagnosed with asthma, and therefore had not received appropriate treatment. Furthermore, many parents had misconceptions about asthma treatment and often herbal remedies had been used as first-line asthma management. As a health care professional, I felt frustrated because I knew adolescents need long term management of their variable condition, rather than only emergency treatment of symptoms. I also felt it was particularly important for adolescents to know how to manage asthma independently, because there are few health care professionals in Jordan, and no asthma educators in hospitals or community centres. The help I was able to offer was restricted to educating parents about monitoring the early symptoms and the need to seek treatment for their children as early as possible.

I came to Australia to do further postgraduate studies and learn more about research. While I was doing my masters degree, I decided to focus on asthma education in children and adolescents in Jordan to help young people be responsible and self-manage their condition to avoid unexpected emergency exacerbations. My supervisors referred me to an experienced asthma researcher to discuss my passion about helping adolescents with asthma in Jordan. Fortunately, this researcher had already developed Triple A, a program that uses senior students to teach younger peers about asthma and self-management in schools. I thought that such a program could be helpful for adolescents in Jordan and could fill a gap in the provision of services. As a result, I was keen to test whether the peer-led approach, as exemplified in Triple A, would be effective in schools in Jordan.

The thesis is structured as follows:

Chapter One explores peer relationships and the complexity of peer influence in adolescence. Evidence is provided to support the use of peer educators in adolescent health education in schools to teach and encourage the adoption of healthy behaviours. In particular, the effectiveness of peer-led health education programs for teens in improving knowledge and changing health-related behaviours is explored and compared to traditional adult-led programs.

Chapter Two focuses on adolescent asthma and related self-management. The significance, impact, challenges and opportunities for managing asthma in adolescents in particular are reviewed. Smoking behaviour and its relationship with adolescent asthma is also explored. Finally, the challenges to adequate self-management of adolescent asthma in a developing country such as Jordan are discussed.

In Chapter Three, the intervention in this thesis (Triple A) is described. The approach of the program, including the protocol and theoretical framework, is also detailed. In addition, the chapter examines the effectiveness of the Triple A program for adolescents with asthma and the school community, and compares it with traditional asthma interventions. The available school-based peer-led approaches in Jordan and the potential for the success of the Triple A program are also explored. Chapter Four describes the pilot phase, which was a process evaluation used to examine the need, feasibility, acceptability, and adaptability of Triple A in Jordanian high schools. The resulting implications for the randomised, controlled trial are then outlined.

Chapter Five describes the cluster randomised, controlled trial used to test the effectiveness of the Triple A in Jordan (TAJ). In particular, the sample size, randomisation techniques, implementation of TAJ in schools, and finally data analysis are provided in detail. Chapter Six describes the characteristics of students with asthma who participated in the trial. Finally, the effects of TAJ on asthma-related quality of life, asthma knowledge of self-management, and self-efficacy to resist smoking are also examined in full.

Chapter Seven discusses the major findings of the trial in the context of previous work and focuses on adolescent asthma and smoking in Jordan. It also highlights the importance of the universal program elements in TAJ's success and discusses the trial strengths and limitations. Moreover, Chapter Seven details the implications for clinical practice and makes recommendations for future research in Jordan and overseas. Finally, Chapter Eight provides a review of the thesis chapters and provides a conclusion.

Chapter One - Background

1.1 Introduction

The influence of peers in social groups occurs across age groups, contexts, and cultures. Peer influence has a particularly powerful effect on adolescents as they seek group acceptance to increase their sense of belonging. This influence often affects their health-related decisions and behaviours, and leads to peer pressure. Peer relations always occur in contexts, and most adolescent peer groups are created within the school setting, which helps to promote peer pressure. The influence from peers is complex, subtle, and includes both positive and negative effects (Kobus, 2003). For example, peer pressure can have negative effects on adolescents' health such as risk-taking behaviour like cigarette smoking, which can affect their transition to healthy adulthood. However, researchers and health care professionals can also use the dynamic of peer pressure in a positive manner through peer-led education. Through such programs, peers act as positive role models and allies to spread important health-related messages and teach their peers appropriate health management skills.

Several peer-led health education programs, particularly in the school setting, have been reported in the literature over the last two decades and aim to promote self-management of chronic diseases, adopt new health-related behaviours, or prevent risky behaviours. Such programs acknowledge the universal influence and credibility of peers, as well as the impact of the amount of time adolescents regularly spend with their peers during and after school on adolescents' daily lives. As this chapter will show, peer-led health education also focuses on the strengths and ability of adolescents and empowers them to make appropriate decisions that often result in better health outcomes. Such programs are often cost-effective and enjoyable, employ a feasible and practical approach, and have several benefits for peer leaders, such as improved communication and leadership skills (Green, 2001; Ochieng, 2003). Moreover, peer-led health education programs empower peer educators to disseminate a range of crucial messages that are likely to affect several health-related behaviours in addition to the ones originally targeted in these programs (Ochieng, 2003). In summary, peer-led

programs that are school-based can be effective in helping promote health-related behaviours in adolescents that may ultimately lead to better quality of life.

This chapter explores the basis of peer pressure in adolescence and explains the behavioural impacts of peer groups on adolescents' choices, decisions, and behaviours, including those related to health. This chapter also outlines the rationale for using the peer-led approach in health promotion initiatives by providing a critical evaluation of the effectiveness of existing peer-led programs during adolescence. It also explores the advantages of peer-led health education within the school contexts in comparison to adult-led approaches. The benefits of peer educators within adolescent peer culture as well as the personal benefits for peer leaders are highlighted as well.

1.2 Peer Pressure in Adolescence

Peer pressure affects individuals within a social group of all ages and cultures, but the influence of peers is very powerful in adolescence (Maxwell, 2002). Peers are generally defined as those who are similar in at least one of many aspects, including age, gender, race, culture, socio-economic status, and sexuality (Bament & South Australian Community Health Research, 2001). The significant increase in peer influence occurs as part of normal social development during adolescence. In adolescence, substantial similarities in age, concerns, experiences and thoughts, as well as the increased time adolescents spend together mean that peer influence is particularly powerful during this stage of life (Hallinan & Williams, 1990; Maxwell, 2002). Because friends and peers are very important as part of normal social development, their influence is increased.

Adolescents seek peer group acceptance because they feel a need to belong (Brownell & Gifford-Smith, 2003; Haynie, 2002). Also, rapid developmental changes happening in adolescence make seeking autonomy and coping with identity issues top priorities (Arnett, 2007; Steinberg, 2005). Adolescents try to belong to a certain peer group to develop a sense of identity and autonomy from parents (Brown & Lohr, 1987: cited in Sussman, Pokhrel, Ashmore, & Brown, 2007). While adolescents are in the

process of developing independence from their parents and beginning to make independent choices, they are simultaneously moving closer to a bigger social world of peers and friends (Sussman et al., 2007). Thus, peer groups help with adolescents' conversion into a social environment that is much larger and more influential than their family. Despite the marked improvements in cognitive and decision making abilities (Paus, 2005; Steinberg, 2005), the lack of experience in making decisions and independent choices away from parents often pushes adolescents to seek support and help from members of a certain peer group (Sussman et al., 2007).

The main context in which social interactions between adolescent peers take place is school-related (Sheridan, Buhs, & Warnes, 2003, Brownell & Gifford-Smith, 2003). Adolescents spend regular, increased time interacting together during and after school hours through both curricular and extracurricular activities, which promotes peer influence within the school setting and results in the creation of several potential peer groups. Age-based classrooms, for instance, create specific contexts within the school that are social environments, in which adolescents' behaviours are shaped by the attitudes and behaviours of classmates (Urdan & Schoenfelder, 2006). Because of the key adolescent developments outlined above school is a stronger social context for adolescents than other environments such as the home (Brownell & Gifford-Smith, 2003).

It is important to note that adolescents may separate themselves into different peer group types and identify themselves by group membership at school (Sussman et al., 2007). Athletes, academics, elites, and deviants are some examples of peer group types within the school environment. Group identification may be complex because adolescents can be members of more than one peer group depending on the social context in which a certain peer group has been created (Gettinger, 2003). The names of the groups reflect the shared lifestyle characteristics, including beliefs, interests, and preferences (Sussman et al., 1990). Based on this, peer group members discuss many personal and social topics of concern or interest, and share opinions through daily communication. However, peer group identification goes beyond friendship. To become an accepted and valued member of a peer group, adolescents have to modify

their behaviours to be similar to other members, and follow the group rules and norms to prevent rejection by the group (Kobus, 2003). Therefore, adolescents become dependent on their peers' choices and judgment about various things, including clothing, general appearance, and health-related choices (Story, Lytle, Birnbaum, & Perry, 2002). In a recent high quality review of 44 studies on adolescent peer group identification, deviant peer groups reported greater participation in risky health-related behaviours compared to academics and athletes (Sussman et al., 2007). Thus, identification with a particular peer group will affect adolescents' social behaviours, including health, according to that group's values and the degree of belonging adolescents feel (Brownell & Gifford-Smith, 2003).

Peer influence can extend to influence adolescents to do something they usually would not choose to do, because of their morality and values, or to stop a behaviour an adolescent would often like to do (Kobus, 2003). This is defined as peer pressure, which can be achieved by forcing, teasing, hurting, or criticising individuals, who resist or reject the peer group's behaviours and attitudes (Arnett, 2007). Peer pressure therefore plays a central role in adolescence, because it influences the development of personality, morality and identity, and can be too powerful for an individual adolescent to resist or manage (Morrison, Kalin, & Morrison, 2004). Self-motivation may align with peer pressure direction as adolescents are usually tempted to try and experience new behaviours that could be risky, and they like to try them in a safe context with their peers, without realising the potential risks involved (Cohn, Macfarlane, Yanez, & Imai, 1995; Steinberg, 2005).

Because peers within a peer group serve as a reference point against which adolescents determine their degree of health, peer pressure plays a particularly important role in shaping health-related behaviours (Story et al., 2002; Velsor-Friedrich, Vlasses, Moberley, & Coover, 2004). If an adolescent belongs to a peer group that holds favourable attitudes to health and provides a motive for that adolescent to adopt healthy behaviours, then that adolescent subsequently may modify his/her behaviours (Steinberg, 2005). In contrast, if an adolescent belongs to a peer group that encourages unhealthy behaviours and the group members behave in a way that can

harm their health, then that adolescent is usually pressured to adopt those unhealthy behaviours (Kobus, 2003; Steinberg, 2005). Gettinger (2003) also highlights the importance of peer relationships among adolescents, who are different from their friends and peers, on certain aspects such as physical well-being. These dissimilar and sick students are more likely to face rejection from healthy friends and peers regardless of their own social or interpersonal skills, so they have extra pressure and make more effort to 'fit in' and be accepted by and similar to, other healthy peers (Gettinger, 2003).

The relatively strong peer influence on students with chronic diseases can be illustrated by the example of adolescent asthma. If the group rules are not consistent with what adolescents with asthma should follow, then they may feel different from other peers in the same group, and subsequently may be rejected by those peers (Kyngas, 1999). Adolescents with asthma may push beyond their physical limits to keep up with healthy peers, and this might lead to serious health consequences (Velsor-Friedrich, et al., 2004). The desire for peer acceptance and the need to be part of a peer group may also lead to other risky behaviours, such as active or passive smoking (Bjornson & Mitchell, 2000; Price & Kemp, 1999). The role of peers in adolescent smoking is investigated later in Chapter Two. Therefore, positive peer attitudes regarding asthma and understanding of the chronic nature of asthma are vital in the school environment (Ayala et al., 2006; Sloane & Zimmer, 1993). These positive attitudes makes peers more supportive to adolescents with asthma, who may, subsequently, feel less embarrassed about taking medications in front of their peers and more confident in avoiding certain triggers (Paus, 2005; Sin, Kang, & Weaver, 2005; Steinberg, 2005).

Overall, peers are important to adolescents, and their influence is especially powerful for health-related behaviours. Therefore, the peer-led approach has been used to change adolescent health-related behaviours in order to capitalise on and positively use this influence in a constructive way, as detailed in the next section of this chapter.

1.3 Peer-Led Health Education in Adolescence

One of the major concerns regarding the adoption of risky health related behaviours by adolescents is the long term consequences, such as increasing the chance of lung cancer in case of cigarette smoking (Backett-Milburn & Wilson, 2000; Cowie, 1999; Ochieng, 2003). Therefore peer-led education has been used increasingly in health promotion initiatives, and utilising peers to serve as positive role models to alter adolescents' behaviours and to maintain adequate disease self-management has been shown to be effective (Green, 2001). Such programs rely on and build on adolescents' capacity to achieve positive changes in regards to their health. There are many forms of peer education, including peer-led interventions, and therefore a variety of roles, such as peer educators or peer leaders (Shiner, 1999). Given the flexibility of adolescent peer education, several aims and methods of information delivery are available (Shiner, 1999). Depending on their objective, researchers use peer allies to implement interventions that lead to change in their peers' self-management behaviours, development of positive group norms, or improve adolescents' ability to make healthy decisions (Bament & South Australian Community Health Research, 2001; Shiner, 1999; Turner, 1999). Such programs have been undertaken in areas such as sexuality, asthma, and drugs and substance use (Backett-Milburn & Wilson, 2000; Chen, Chim, Strunk, & Miller, 2007; de Benedictis & Bush, 2007; Dunn, Ross, Caines, & Howorth, 1998; Shah, Mamoon, & Gibson, 1998; Speizer, Magnani, & Colvin, 2003; Story, et al., 2002).

Generally, researchers use two main forms of peer-led interventions according to the intent, nature, and complexity of the intervention and information needed to be disseminated (Shiner, 1999; Story et al., 2002). For instance, formal peer-led education programs are often structured, use peer-selection techniques for nominating peer leaders, provide rigorous training, are supervised by adults, and are mostly implemented in the school context. In contrast, informal peer education programs usually provide less intensive training for peer supporters who informally pass on simple information and provide support to their peers with minimal adult supervision, (Shiner, 1999). These informal programs usually occur outside the classroom.

Regardless of the type of program, the theoretical justification for using peer educators is often based on a developmental and socio-contextual framework of adolescence (Story et al., 2002). One element of this framework is centred on Social Cognitive Theory, which is explored in greater detail in Chapter Three. According to this theory, new behaviours often appear on a trial basis, owing to either chance or powerful role models (Bandura, 1977). Therefore, adolescent health-related behaviours may be trialled spontaneously or by imitating peer role models, however, it is reinforced as a desirable behaviour most substantially by peers (McAlister, Perry, & Maccoby, 1979). The theory also suggest that the most powerful role models are those who are similar, thus peers can be successful persuaders (Bandura, 1994). Peer-led education programs can use this persuasive ability positively by having trained adolescent leaders teach their peers how to resist negative peer pressure and help them to adopt healthy behaviours (Bandura, 1984; Elliott & Lambourn, 1999; Green, 2001; Milburn, 1995; Turner, 1999).

Furthermore, adolescents spend time discussing contentious issues with peers as adolescents trust their peers' knowledge. Adolescents tend to trust and admire peers' beliefs and knowledge more than adults' beliefs and knowledge, even if peers may lack correct information (Green, 2001; Topping, 1996; Turner & Shepherd, 1999). For example, health care professionals are sometimes perceived by adolescents as unable to properly understand what it is like to be young and have health problems at the same time (Buston & Wood, 2000). Importantly, adolescents are often unwilling to discuss certain health-related issues with adults, especially sensitive ones, such as sex and drugs, preferring to access knowledge about these issues from their peers, although the accuracy of this knowledge is likely to be low (Suzuki & Calzo, 2004). Importantly, adolescents find it reassuring to turn to credible friends for advice as they understand and sympathize with them and are in a similar position (Buston & Wood, 2000; Lingren, 1995). This helps make peer-led education more acceptable to adolescents. Therefore, peer-led education programs capitalise on adolescents' abilities to learn from each other and solve their own problems without seeking adults' advice (Cowie, 1999; Story et al., 2002; Turner, 1999). Overall, peer-led education programs recognise the importance of, and similarities between peers and the strong influence peers have on adolescents, including the potential for peers to make such programs more enjoyable

(Ennett & Bauman, 1996; Ennett, Flewelling, Lindrooth, & Norton, 1997; Mellanby, Rees, & Tripp, 2000).

Other characteristics of peer leaders also contribute to making them more preferable to adult educators. For example, peer educators tend to teach using strategies that encourage and empower students to adopt healthy behaviours rather than to direct or instruct (Ochieng, 2003). Peers are also more likely to listen and respond to peer suggestions (Tencati, Kole, Feighery, Winkleby, & Altman, 2002). In addition, peer leaders are likely to be easier to train than adults such as teachers for educational programs aimed at changing behaviour (Klepp, Halper, & Perry, 1986). This is because peer educators have more available time, are easier to access, and often cost less in comparison to adults or health professional leaders (Buston & Wood, 2000; Green, 2001; Klepp et al., 1986). Interestingly, peer leaders are more likely to be empowered to disseminate a range of health-related messages to their peers beyond those included in the programs. These messages are expected to impact on several health-related behaviours other than the one originally targeted by the program, thus creating a ripple effect (Ochieng, 2003). One possible explanation for this is that peer leadership provides adolescents a sense of control and social usefulness that can be empowering (Turner, 1999).

There are also clear benefits of involvement for the peer educators themselves. These benefits include significant increases in knowledge, empathy, self-esteem, confidence, tolerance to others, self-discipline, cognitive gains, and positive attitudes to school (Ochieng, 2003; Turner, 1999). Moreover, Ochieng (2003) reported that being a peer leader increases the chance of gaining assertiveness, leadership and communication skills, as well as responsibility and nurturing. This suggests that more adolescents should be encouraged to participate as peer leaders in peer-led education programs for their own benefits as well as for the targeted group (Green, 2001; Ochieng, 2003). Ensuring a diverse range of adolescent leaders for achieving the maximum benefits of peer-led education across all peer groups within the school setting is vital. This can be facilitated by using the voluntary peer selection technique, in which

all adolescents have the chance to be trained as peer educators, including those who may belong to deviant peer groups (Green et al., 1980; Story et al., 2002).

Depending on the nature and complexity of the intervention, adequate and structured training is important to diminish the relatively few risks associated with using peer educators (Gallant & Maticka-Tyndale, 2004). Because peer leaders are popular and influential role models, they may have certain personality characters that could accidentally affect their peers' choices and behaviours negatively. This possibility is more likely to occur if peer leaders' attitudes, personal and social characteristics are not considered or monitored, or when those peer leaders are not adequately trained (Gallant & Maticka-Tyndale, 2004; Walker & Avis, 1999). In addition, peer educators may teach students inaccurate information that might result in health-related risks, or even use their position to exploit their peers (Adamchak, no date; Gallant & Maticka-Tyndale, 2004). Therefore, training is important as well as supervision of peer leaders by adult educators during the peer-led education process to minimise the likelihood of these risks (Adamchak, no date).

1.4 School-Based Peer-Led Health Education Programs

The setting of peer-led education programs, both formal and informal, mainly depends on the target group receiving the education. Earlier in this chapter, the school context was identified as being important for adolescents, however, historically, peer education has taken place in many different contexts, including schools, community, universities, and youth centres (Turner & Shepherd, 1999). In the school setting, peer-led education is defined as 'students delivering an educational programme who are of similar, or slightly older, age than the students receiving the program (Mellanby, Rees, & Tripp, 2000, P. 483). This type of peer-led education acknowledges the importance of the school environment in supporting sustained time for interaction and school-based social peer groups on adolescents' daily lives (McCann, McWhirter, Coleman, Calvert, & Warner, 2006; Turner & Shepherd, 1999). Moreover, schools are an ideal place for providing adolescent health-related education due to the practicality and familiarity of the school environment to students (Cohall et al., 2007; Ennett & Bauman, 1996; Ennett et al., 1997; Lurie, Straub, Goodman, & Bauer, 1998; McCann et al., 2006).

Furthermore, schools promote the opportunity to reinforce knowledge through continuous social contact, and provide a good setting for reaching large numbers of adolescents in the community (Cohall et al., 2007; Ennett & Bauman, 1996; Ennett et al., 1997; McCann et al., 2006; Valeros, Kieckhefer, & Patterson, 2001).

Schoolteachers also agree that schools are a suitable setting to disseminate health-related education messages during adolescence, thus making peer-led programs more feasible to implement (Cohall et al., 2007). Importantly, the value of implementing such programs in conjunction with schools has been shown to promote long-term behaviour change (Walker & Avis, 1999).

In comparison to programs led by adults, school-based programs led by peers have been found to be more effective, at least in the short-term (Cuijpers, 2002). In this good quality systematic review of drug prevention programs for adolescents 12 education programs that are based in schools were included, with a total sample of 12400 participants. Using a meta-analysis, Cuijpers (2002) concluded that while some adult-led programs were effective, overall peer-led prevention programs resulted in less drug use immediately after intervention, but neither program type was effective over the long term of 1 or 2 years post-intervention. It was suggested that peer interventions with more sessions, more interactions between students during the intervention, and better quality program contents were more likely to result in success (Cuijpers, 2002). Aside from the limitations related to the diversity of programs, the reviewers also noted that no study was conducted in a non-western country and that the peer leaders' ages and target groups ages differed, important issues to correct. Nonetheless, peer-led education is likely to be more effective than adult-led education immediately post intervention. This conclusion was also supported by Mellanby and colleagues' earlier review, which included 4 additional trials to Cuijpers' review (Mellanby et al., 2000). Mellanby and colleagues concluded that peer-led education is potentially promising as it was more effective than adult-led education in improving knowledge, changing health behaviours and attitudes, and promoting self-management in adolescents (Mellanby et al., 2000). This review highlights the need to determine whether an effective peer-led educational program can be sustained within the normal school curriculum structure.

Since Cuijpers' systematic review was published, additional peer-led school-based programs have emerged, the most prominent of which is the 'ASSIST' (A Stop Smoking In School Trial) program. In this well-conducted multi-site trial, Audrey and colleagues (2006) sought to reduce smoking prevalence among school. A total of 10,730 year 8 students was recruited from 59 high schools in England, 835 of whom consented to be trained as peer supporters and Audrey et al were able to attain a retention rate of 87%. In this study, peer supporters were nominated by their peers, thereby ensuring that the most influential members of several peer groups were involved (Audrey et al., 2008). At 12 months post intervention, the smoking prevalence among occasional smokers in the intervention schools was 18.2% lower than in the control schools and non smokers' determination not to smoke was reinforced. The findings of this study demonstrate that peer-led program can utilise peer pressure in a positive manner to change critical health-related behaviours such as smoking, even when this behaviour may have been originally initiated through negative peer influence.

While most peer-led education programs that occur in schools focus on primary prevention, there is also a need for disease specific programs that target self-management of diseases which are already present. One such example is asthma, a highly prevalent chronic condition in adolescence, which can affect many aspects of daily life if poorly managed. Promoting self-management is important because many of the effects of asthma can be controlled. One example of a school-based peer-led program for adolescent asthma is the Triple A program (Shah, Gibson, Wachinger, Kary, Halliday, 1995). This program was trialled in high schools in Australia and found to be effective in improving asthma-related quality of life and knowledge, and reducing school absences among adolescents with asthma. As asthma is the disease focused on in this thesis, asthma related issues will be discussed in Chapter Two and the Triple A program will be discussed in detail in Chapter Three.

1.5 Summary

In summary, peer-led education is effective in utilising peer pressure in a positive manner to improve health-related behaviours in adolescence. The school setting fosters and enables the influence from peers. Trained peer leaders are persuasive

and credible and they often use support and empowerment strategies. However, the content of the program and adequate training and supervision of peer leaders are also important factors in program success. There is some evidence that peer-led education programs in a school context are more successful than adult-led programs in promoting health-related behaviours and increasing resistance to risky behaviours, however, few of these studies have been undertaken outside of western countries or for chronic diseases such as asthma. Therefore, there is a need to explore the potential effects of such programs in chronic diseases such as asthma and in other countries such as Jordan. The next Chapter therefore investigates asthma in adolescence and highlights the opportunity for peer-led programs in schools to achieve better health outcomes for adolescents with asthma.

Chapter Two - Asthma in Adolescents

2.1 Introduction

Asthma is a highly prevalent and persistent chronic disease, in which exacerbation of symptoms can be avoided or adequately managed through self-management. Importantly, appropriate self-management of asthma, although challenging in adolescents, is critical for minimising the negative impact of asthma on their quality of life. Like any other health-related behaviour in adolescence, self-management of asthma is influenced by the peer group and the peer culture within schools.

Adolescent asthma is a particularly significant health problem in countries like Jordan because it is underdiagnosed and thus potentially undertreated and therefore needs to be investigated in more depth. As has been acknowledged in Chapter One, peer pressure is universal, so peer-led health-related education programs could be effective for adolescents with asthma in countries like Jordan, where the intervention tested for this thesis was implemented. Interestingly, there is a tendency for asthma researchers to refer to adolescents as children, and to combine data from children and adolescents together. It is preferable to focus on adolescents, but due to the relative lack of research specific to this age group, studies grouping children and adolescents as one population are included here and referred to as adolescents.

This chapter describes the global asthma prevalence in adolescence as well as specific to the Middle East. The potential impact of asthma on adolescents' lives is explored and the vital role of adolescent development and the associated opportunities and challenges to effective asthma self-management are discussed.

2.2 Prevalence of Adolescent Asthma

Asthma is a disease of the lungs and airways whose exact cause is still not known (National Heart, Lung, and Blood Institute, 1997). Regardless, chronic inflammation occurs in the lung airways (Bryant-Stephens & Li, 2004), as well as increased airway responsiveness and inflammation, and recurrent episodes of symptoms (Global Initiative for Asthma (GINA), 2003). These symptoms include wheezing from airway spasm and narrowing, cough, chest tightness and breathlessness (Global Initiative for Asthma (GINA), 2003; National Heart, Lung, and Blood Institute, 1997).

The airway obstruction arising from asthma tends to increase steadily from age 5 to 18 years in both sexes (Strunk et al., 2006), so that adolescents aged 13-14 years may report a higher prevalence of asthma symptoms than 6 - 7 year old children (International Study of Asthma and Allergies in Childhood (ISAAC), 1998). This is in contrast to common beliefs that children outgrow asthma when they become adolescents. Importantly, remodelling or irreversible changes in the structure of the lungs due to inflammation may occur if asthma is not appropriately treated at this age (Hannaway, 2004). Infrequent intermittent asthma is most common in adolescents, although serious exacerbations can result if it is poorly managed, with some reports suggesting that more than one-third of adolescents, including those with mild asthma, have experienced an asthma exacerbation severe enough that they thought they were going to die (Dusser et al., 2007; Global Initiative for Asthma (GINA), 2003; National Asthma Education and Prevention Program, 2007, Cohen, Franco, Motlow, Reznik, & Ozuah, 2003).

Asthma is one of the most common chronic diseases occurring in adolescence worldwide (Habbick et al., 1999; Randolph & Fraser, 1999). In the Middle East, the prevalence of asthma among adolescents is comparable to developed countries, ranging from 14.4% in Lebanon (The ISAAC Steering Committee, 1998) to 23% in Saudi Arabia (Al Frayh, Shakoor, Gad El Rab, & Hasnain, 2001). The current prevalence of adolescent asthma in Jordan is not known, as the only published study is more than a decade old. This study reported that the overall prevalence of asthma in the early 1990s

in Northern Jordan was 4.1% among schoolchildren, aged 6-12 years old (Abuekteish, Alwash, Hassan, & Daoud, 1996), which was low in comparison to the prevalence of asthma reported in Saudi Arabia at that time (Al Frayh et al., 2001). However, it is reasonable to presume that the prevalence in Jordan has increased, following the pattern of sharp increase in rates of asthma seen in developed countries (Asher et al., 2006; Fernandez-Benitez, Anton, & Guillen Grima, 2007; Navon, Fiore, & Anderson, 2005) before these rates stabilise (Goren & Hellmann, 1997; Lawson & Senthilselvan, 2005; von Hertzen & Haahtela, 2005). These increases may be related to industrialisation (Lawson & Senthilselvan, 2005), and therefore likely to have similarly affected Northern Jordan, where industrial air pollution has grown (Goren, Hellmann, Gabbay, & Brenner, 1999). Indeed in the Middle East it has been shown that the rate of asthma prevalence increases as regions become urbanised, industrialised, and follow western life styles (Al Frayh et al., 2001; Hijazi, Abalkhail, & Seaton, 2000; Jahani, Bener, & Bush, 2006; Lawson & Senthilselvan, 2005; Uyan, Gozukara, & Yesildal, 2003; World Health Report, 2001). For example, in Saudi Arabia, the prevalence rate of asthma tripled during the 1990's (Al Frayh et al., 2001).

Regardless of these factors, prevalence rates are often underestimated because of the underdiagnosis of adolescent asthma, which is a universal problem, but may be particularly relevant in Jordan. For example, surveys conducted in six developed countries in Europe reveal a significant group of adolescents with "asthma-like symptoms" without a professional diagnosis of asthma (Hublet et al., 2006). In this study, the prevalence of adolescents with "asthma-like symptoms" ranged from 6.5% to 21.8% (Hublet et al., 2006). Similarly, 11% to 17% of symptomatic adolescents lacked a professional diagnosis in a survey conducted in the US state of North Carolina (Yeatts, Shy, Sotir, Music, & Herget, 2003). Under-recognition of asthma in Jordan is likely to be more common as parents may be less willing to seek medical care for children with asthma symptoms, and doctors are reluctant to tell parents about an asthma diagnosis (Abuekteish et al., 1996). For example, 8.3% of Jordanian schoolchildren, aged 6-12 years, reported recurrent wheezing without a diagnosis of asthma by a doctor (Abuekteish et al., 1996). According to Abuekteish's study, the estimated prevalence could be as high as 12.4% in Jordan when diagnosed (4.1%) and undiagnosed asthma prevalence rates (8.3%) are combined. This rate is comparable to

many other neighbouring and developed countries. Underdiagnosis can have serious consequences, mostly in relation to adequacy of treatment. Overall, asthma in Jordanian adolescents is prevalent, under-recognised, and potentially undertreated. Therefore, the impact of asthma on young people in Jordan can be more severe than is necessary, with potential consequences for morbidity and mortality, as explained in the next section.

2.3 Health-Related Quality of Life for Adolescents With Asthma

The impact of asthma on adolescents varies, especially if managed poorly (Woodgate, 1998). This impact includes impairment in quality of life, emergency hospitalisations and fatality in some cases. Unfortunately, the negative consequences of asthma on adolescents appear to have increased during the past two decades in terms of limitations in activity level and social and emotional impairments (Akinbami & Schoendorf, 2002). This is striking because it has occurred alongside increased availability of effective treatment (Rutishauser, Sawyer, & Bowes, 1998). There is some indication that poor asthma management among young people may be a contributing factor with asthma-related death rates in children and adolescents increasing by 3.4% per year from 1980 to 1998 in the US (Akinbami & Schoendorf, 2002; Couriel, 2003). Furthermore, hospitalisations due to childhood asthma have increased 36 percent since the early 1990s in the US as well (The National Centre for Health Statistics, 1999). While, some of these outcomes may have been unavoidable, it is likely that good self-management may have reduced the illness burden. It should be noted however that these statistics are relatively old and changes could have occurred recently.

The illness burden is not confined to the individual with the illness as health care utilisation due to adolescent asthma can often result in a high economic burden (Lozano, Sullivan, Smith, & Weiss, 1999). The cost of asthma in the US in the year 2000 was estimated at more than \$14.5 billion (Gergen, 2001; The National Centre for Health Statistics, 1999). If appropriate self-management was in place it has been estimated that \$1 billion annually in the US alone could be saved (Gergen, 2001). Therefore, the development of effective asthma interventions is important not only to

reduce the impact of the disease on individuals but also to reduce the health care costs for the community.

Aside from the outcomes noted above, asthma is considered a challenging disease for adolescents because it can cause significant physical (activity level), social, and emotional impairment for both adolescents and their parents, making adolescents with asthma feel different from their healthy peers (Hazell, Frank, & Frank, 2003; Jones, 2007; Juniper et al., 1996; Marklund, Ahlstedt, & Nordström, 2004; Matheson et al., 2002; Townsend et al., 1991; Woodgate, 1998). These multifaceted effects have led clinicians to recognise the value of assessing and evaluating multiple aspects of health-related quality of life for adolescents with asthma (Juniper, 1997; Rutishauser et al., 1998). These effects will now be discussed.

Physical impairments and impact on school attendance and performance. Asthma symptoms can affect adolescents' physical function and interrupt their daily activities, which can have academic and social consequences (Rhee, Wenzel, & Steeves, 2007), especially on school attendance (Navon et al., 2005; Okele et al., 2004; Yeatts & Shy, 2001). Young people with asthma may need to leave classes, miss a day or several days when exacerbation of symptoms occurs. In addition, other physical effects such as snoring and sleep disruption (Ekici et al., 2005; Yeatts & Shy, 2001) and medication side effects, if used inappropriately, may lead to poor concentration at school. In total, there is reduced educational input with reduced chances of adolescents with asthma to achieve educational goals, which may limit their future career options and capacity for independence (McCorkle, 2005, Sundberg, Toren, Hoglund, Aberg, & Brisman, 2007), and parents' work attendance (Schmier et al., 2007). Research has shown that asthma is a common cause of school absences in adolescents, causing them to miss 10 million school days annually in the USA alone (The National Centre for Health Statistics, 1999). While the consequences of physical impairment for school attendance are important, it should be noted that physical impairment also interacts with emotional issues (Swahn & Bossarte, 2006).

Emotional impairments and associated negative feelings. The impact that asthma has on adolescents' emotional well-being can result in depression in severe cases, and the potential for adoption of risky health-related behaviours, such as cigarette smoking and cocaine use (Annett, Bender, Lapidus, DuHamel, & Lincoln, 2001; Bender, 2007). This may cause a cycle of impairment, which often leads to less control of symptoms, less positive feeling toward self-management and therefore additional physically related emotional impairments (Cohen et al., 2003, Bender, 2007; Goodwin, Messineo, Bregante, Hoven, & Kairam, 2005; Hazell et al., 2003; Matheson et al., 2002; Okelo et al., 2004). However, this cycle may work positively as well; Cohen and colleagues (2003) argue that a feeling of control over asthma symptoms is associated with positive feelings towards self-management for adolescents. Therefore, it is not surprising that in adolescents with asthma, the impact of emotional impairments is higher than that of physical impairments with respect to overall quality of life (Goldbeck, Koffmane, Lecheler, Thiessen, & Fegert, 2007; Montalto, Bruzzese, Moskaleva, Higgins, & Webber, 2005; Richardson et al., 2006; Vila et al., 2003).

The negative feelings that can develop toward asthma are illustrated well in Rhee et al's (2007) study of teens' daily experience with asthma. Adolescents with asthma in this study often blamed the disease for their limited social network, as well as limitations to their physical activities. They felt that life was unfair because they had a chronic condition unlike their healthy peers, and were embarrassed by using medications or experiencing symptoms in front of their peers at school. Other feelings reported included annoyance, not just from the daily symptoms, but also because they had to use medications at school several times, and fear of unpredictable attacks, the side effects of the medication or possible death (Rhee et al., 2007; Swahn & Bossarte, 2006). These feelings are complex and are perceived to be connected to the lack of understanding and support from their adolescent peers, parents, and school members (Rhee et al., 2007).

Importantly, negative feelings, such as embarrassment, fear, and feeling different from peers, often affects adolescents' confidence to self-manage asthma (Zebracki & Drotar, 2004) and important life choices. When adolescents fear

unexpected asthma exacerbations they may limit their future career choices, particularly avoiding being in a workplace that has asthma triggers (Kulig, 2000). Adolescents also fear that employers would not be supportive or understanding of the nature and demands of their chronic disease leading to unacceptable sick-leave and work absences (Woodgate, 1998). Thus, there are possible far-reaching long-term consequences from adolescent asthma. It is important to note that the majority of the studies reviewed above are small qualitative studies. While they provide rich information about adolescents' experiences, it is important not to generalise to all adolescents. This is particularly important because most studies conducted in northern America, so they may not reflect experiences of other cultures and contexts.

Overall, as perceived by adolescents themselves and also acknowledged by health professionals, asthma is a challenging condition during adolescence that can impact on multiple aspects of the quality of life of young people, particularly physical and emotional well-being. To lessen this impact, health care professionals recommend that individuals with chronic disease need to take full responsibility to self-manage their condition (Newman, Steed, & Mulligan, 2004). Adolescence is a time of change when transition from childhood to adulthood takes place, when rapid growth and development in biological, cognitive, emotional, psychosocial, and sexual aspects occurs (McAnarney, Kreipe, Orr, & Comerchi, 1992; Rhee et al., 2007). Health care professionals argue that these changes present both challenges and opportunities for adolescents to take responsibility when they self-manage asthma (Bruzzese et al., 2004).

2.4 Managing Asthma

Asthma control, as defined according to the GINA guidelines, includes the absence of symptoms or minimal symptoms, no asthma symptoms at night or in the morning less than once per week, minimal use of rescue bronchodilators, an ability to participate in normal activities and sports and normal pulmonary function tests (Asthme-Quebec, 2005). There should also be no side effects to medication. Ideally, asthma control can be primarily achieved through medication management and

avoiding triggers (Lalloo et al., 2007). However, adolescents should be able to deal with all aspects of their condition in order to achieve better health-related outcomes.

Asthma medications. Asthma management can usually be achieved by appropriate treatment that can be adjusted according to the degree of severity (Fuhlbrigge, 2007) using the two main types of asthma medications. The first of these groups are the short-acting reliever medications, of which short-acting B2-agonists are the most effective, and should be used to treat and provide fast relief of symptoms and exacerbations once they occur (National Asthma Education and Prevention Program, 2007). The second group are the long-term controller (preventer) medications, which should be used in persistent asthma to achieve and maintain control, by targeting the underlying inflammation of the airways, and inhaled corticosteroids are the most potent type in this group (Fuhlbrigge, 2007).

Compliance with medications however can be a major barrier to optimal asthma management in adolescence (Bender & Bender, 2005; Dinwiddie & Muller, 2002). Adolescents tend not to use controller medications adequately (Fuhlbrigge, 2007, Bender 1996, Goodman, Lozano, Stukel, Chang, & Hecht, 1999) and overuse short-acting B2 agonists if exacerbations of symptoms occur (Fuhlbrigge, 2007). This non-adherence has been associated with high numbers of emergency visits (Bender, 1996). Adolescents' negative perceptions of asthma medications are important barriers to adequate adherence. These perceptions include cynicism, doubting the medication benefits, concerns about safety and side effects, complexity, related costs, and confidence in medication use (Bender, 2002; Buston & Wood, 2000; Rachelefsky, 2007). The most critical component of these is that adolescents perceive asthma as an episodic rather than a chronic illness, due to the variable nature of symptoms. This perception affects their acceptance of, and adherence to, taking regular controller therapy, regardless of the presence of symptoms, an important aspect of autonomous care (Price, 1996). Nonetheless, therapy adjustments should be based on the individual's level of management and in response to variations in trigger levels (Fuhlbrigge, 2007).

Asthma triggers. Exacerbation of asthma symptoms can be triggered by many indoor and outdoor allergens, including tobacco smoke, weather changes, emotions, air pollution, pollens, infections, exercise, dust mites, pets, and mould (National Asthma Council of Australia (NAC), 2002). As most of these triggers are found in schools, where adolescents spend much of their time, exacerbations often occur at the school environment (Behrens et al., 2005; Epstien, 2001; Salo et al., 2004). In colder climates, asthma prevalence may increase as adolescents stay indoors more, especially during winter, and are exposed to further allergens such as heaters, cigarette smoke, and carpets (Wang, Ko, Chao, Huang, & Lin, 1999). Furthermore, chest infections, such as pneumonia and respiratory tract infections, tend to occur in winter triggering asthma symptoms as well (Clark, Coote, Silver, & Halpin, 2000; Hayashi et al., 1995). Therefore, there is an annual peak in winter in asthma exacerbation of symptoms as well as seasonal peaks in response to changes in pollen levels.

Even though exercise is a common trigger, symptoms can often be prevented by taking medication prior to commencing exercise (National Asthma Education and Prevention Program, 2007). However, there is a common misconception among adolescents with asthma and their families that participation in sports and exercise is a more important trigger of symptom exacerbations than in reality. Exercise is actually beneficial for adolescents with asthma because it improves their fitness and quality of life (Welsh, Kemp, & Roberts, 2005). Therefore, a goal of asthma therapy is participation in physical activity, exercise and sports (National Asthma Education and Prevention Program, 2007). This is supported by the findings of Welsh and colleagues, who recommend that an awareness program of the importance of physical activity for adolescents with asthma should target the whole community, including parents, to overcome the misconception of overprotection (Welsh et al., 2005). While it is unreasonable for adolescents to avoid all triggers, given the diversity and prevalence of these, young people do need to avoid major triggers where possible to minimise exacerbations of symptoms (National Asthma Council of Australia (NAC), 2002). For instance, passive smoking situations need to be avoided inside and outside of school.

Symptom recognition. Young people affected by asthma need to routinely monitor and respond to symptoms of asthma, especially when triggers are unknown. Adolescents with asthma should have a written asthma action plan, which tells them when and how to handle signs and symptoms or deteriorating asthma, and when and where to seek help (Gibson & Powell, 2004). This written action plan should be regularly reviewed and tailored according to the severity of symptoms and asthma status (Fuhlbrigge, 2007). Therefore, adolescents need to visit health care professionals for regular checkups, to review their asthma action plan and tailor these plans as necessary. Visits should also review medications, and should occur if there is an exacerbation of symptoms or an emergency attack (National Asthma Council of Australia (NAC), 2002). No doubt, in many cases these visits to the doctor's office require the support of their parents, who retain a vital role in promoting appropriate care (McQuaid et al., 2001, Orrell-Valente, Jarlsberg, Hill, & Cabana, 2009).

Ideally, the combination of avoiding triggers, taking medications appropriately, recognising symptoms, and visiting health care professionals may allow adolescents with asthma to use lower doses of asthma reliever medications and achieve the primary goal of asthma management (Fuhlbrigge, 2007). However, there are several other aspects of management related to their disease, which also need to be considered, including emotional wellbeing, social development, and learning issues. The total requirements of disease management are necessary for optimal self-management as indicated in the section below.

2.5 Self-Management of Asthma in Adolescence

Generally, self-management of a chronic disease is the ability of an individual to deal with all aspects of his/her condition, including medications, symptoms, physical and social consequences, and lifestyle changes (Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002). Appropriate self-management can result in reduction in hospital admissions and improvement in several health-related outcomes, including quality of life (Barlow et al., 2002; Bodenheimer, Wagner, & Grumbach, 2002). In the context of adolescent asthma, self-management involves establishing self-monitoring routines,

medication adherence, and managing social relationships with parents and health care providers (Bruzzeze et al., 2004).

For successful self-management, adolescents should acquire and master self-management tasks and parents should transfer the responsibility when they feel that their children demonstrate proficiency in self-care (Wade, Islam, Holden, Kruszon-Moran, & Mitchell, 1999). The latter task alone is quite complex. Families often share self-management responsibility with their children, however, transferring the responsibility to the child usually starts even before the stage of adolescence (McQuaid et al., 2001, Orrell-Valente, Jarlsberg, Hill, & Cabana, 2009; Wade et al., 1999). For example, child responsibility of taking daily asthma medications starts as young as 7 years of age but increased with age (McQuaid et al., 2001, Orrell-Valente et al., 2009, Wade et al., 1999).

To achieve optimal health-related outcomes, self-management needs to occur on a daily basis and includes avoiding passive smoking situations from peers or parents and taking medications through asthma devices several times during the day, which cannot be hidden from peers. Because of the lack of parents' awareness of adolescents' self-management behaviours outside the home (at school, with peers), parents' perspectives regarding their children's self-care skills are limited (McQuaid et al., 2001). Adolescents therefore need to be empowered to build confidence and make choices that lead to optimal self-management at home and in the presence of school peers (Coleman, 2005; Sawyer, Drew, Yeo, & Britto, 2007). This can be achieved by offering treatment choices that are suitable to adolescents' lifestyle and their developmental needs (Sawyer et al., 2007).

2.6 Adolescent Development and Effect on Self-Management of Asthma

Adolescence is a period of growth and development that promotes transition to adulthood but also increases vulnerability and risks for health-related behaviours (Paus, 2005; Steinberg, 2005). Developments mainly occur in: a) cognitive ability, b) autonomy and identity, and c) peer relationships and the resulting peer pressure. As

discussed in Chapter One, increased peer pressure may push adolescents to adopt risky health related behaviours that could interfere with these developments and affect their ability to have a healthy transition to adulthood (Green, 2001). Importantly, this transition is more challenging for adolescents with asthma because of the added need to self-manage their condition (Rhee et al., 2007). Adolescents who are coping poorly may have long term consequences such as a delay in the accomplishment of some developmental tasks (Viner, 2001). This section describes these developments and explores opportunities and possible barriers to effective self-management among adolescents with asthma.

Cognitive development. The cognitive development that occurs in adolescence leads to an expansion in thinking and learning abilities, thus enabling adolescents to become more accurate in perceiving, recognising, and managing asthma exacerbation than younger children (Paus, 2005; Wadsworth, 1989). In particular, adolescents usually show marked improvements in reasoning, information processing, and expertise, which often lead to significant improvement in long-term planning (Steinberg, 2005). Decision making is an important aspect for effective asthma self-management because the course of symptoms varies and multiple aspects for a frequently changing asthma management plan need to be processed (Clark et al., 1998). Adolescence therefore offers an opportunity for adolescents to adopt new healthy behaviours and learn the skills, which are needed to stay healthy while parents' supervision is minimised (Wade et al., 1999). Based on this, adolescents should have better health-related outcomes if they make the right decisions (Yoos & McMullen, 1999).

Therefore, adolescence seems to be an ideal time to gain more understanding of asthma-specific knowledge and skills required for adequate self-management (Steinberg, 2005). Asthma-related knowledge is a necessary determinant of the level of self-management (Carson, Council, & Schauer, 1991; Sin, Kang, & Weaver, 2005), and considered a vital step in better management (Sin et al., 2005). Researchers reported that low asthma-related knowledge scores tend to be associated with poor management, whereas high scores tend to be positively associated with better management

(Abdulwadud, Abramson, Forbes, & Walters, 2001; Gibson, Henry, Vimpani, & Halliday, 1995). Additionally, knowledge about asthma is assumed to facilitate motivation, greater understanding, and adherence to self-management (Gibson et al., 1995; Guevara, Wolf, Grum, & Clark, 2003). Regardless, there is a vital need to empower adolescents and encourage them to be more adherent to self-management tasks and to ensure uptake of health related behaviours that are required for successful self-management, rather than focusing only on increasing their knowledge and understanding about the disease (Gibson & Powell, 2004). This is particularly true given the established interaction between cognition and emotional processes, especially in the context of peer-peer relations (Paus, 2005), which suggests that involving peers in adolescent education may be crucial for overall health, as adolescents are trying to be self-carers.

Development of autonomy and identity. Similar to cognitive ability, autonomy develops rapidly in adolescence, leading to a shift in the responsibility of asthma management away from parents to independent self-care (Bruzzese et al., 2004; Wade et al., 1999). Adolescents begin to explore on their own and make their own health decisions without seeking parental approval (Ayala et al., 2006). As a result of decreased parental supervision and communication with adolescents, and more time spent with peers, often initiated by the adolescent themselves, parents are often no longer the people most likely to understand the adolescent's asthma status (McQuaid et al., 2001). This means parents may miss early asthma symptoms, or wait too long before intervening, which is crucial when parents retain the major responsibility for visits to health professionals, medication purchase and seeking hospital care.

Autonomy is one aspect of the development of individual identity in adolescence, which is largely affected by peers because adolescents often rely on their peers for feedback (Price & Kemp, 1999). The task of identity development is vital for adolescents because they start to define themselves, separate from their parents, and search for an answer to the question "who am I?". In the context of asthma, adolescents may identify themselves as sick and different, with limited physical activities if they have low levels of control (Bruzzese et al., 2004). Therefore, adolescents with asthma

often try to establish their self-identity and independence without admitting to having asthma (Bender, 2007) because they already feel different from their healthy peers (Price, 1996; Van De Ven, Engels, Otten, & Van Den Eijnden, 2007; Van de Ven, Van Den Eijnden, & Engels, 2006). Ideally, adolescents need to accept their asthma and self-management as part of their identity. Peers can substantially impact on this development (Flores, Abreu, Tomany-Korman, & Meurer, 2005; Yoos & McMullen, 1999). For these reasons, Bruzzese and her colleagues (2004) argue that adolescents and their peers should increasingly be the target of asthma self-management interventions and education. This is important because several health-related behaviours are formed in adolescence and often maintained in adulthood (Van Es, Nagelkerke, Colland, Scholten, & Bouter, 2001). Therefore, educating adolescents with asthma on how to adequately self-manage is more likely to result in positive attitudes and behaviours that continue into adulthood (UNICEF, 2001).

2.7 Smoking in Adolescents With Asthma

Smoking is an example of a serious risky health-related behaviour that usually begins in adolescence and subsequently continues into adulthood (Pierce & Gilpin, 1996). All smoking behaviour needs to be addressed (passive and active), as it is particularly dangerous in individuals with asthma (Bush et al., 2007; Van de Ven et al., 2006), doubling the chance of dying (Doll, Peto, Wheatley, Gray, & Sutherland, 1994). This is because smoking can either cause or increase the risk of more severe asthma (de Benedictis & Bush, 2007; Morfin-Maciel, Barragan-Meijueiro Mde, & Nava-Ocampo, 2006; Navon et al., 2005; Strachan & Cook, 1998; Van de Ven, Engels, Kerstjens, & Van den Eijnden, 2007). Smoking is particularly dangerous in adolescents with asthma because they do not often adhere to controller therapy, which results in more symptoms (Chaudhuri et al., 2003).

Importantly, an asthma diagnosis is not a powerful motivating factor to prevent smoking (Zimlichman et al., 2004). In contrast, higher smoking rates are reported among adolescents with asthma in comparison to those without asthma (Navon et al., 2005; Precht, Keiding, & Madsen, 2003; Zbikowski et al., 2002; Zimlichman et al., 2004). The relationship between asthma and smoking is likely bidirectional, in which

asthma diagnosis can predict smoking onset, and smoking can also increase the risk of developing or worsening asthma (Van de Ven, Engels, Kerstjens, & Van den Eijnden, 2007). Similarly, mental health disorders, such as anxiety and depression that may have resulted from asthma increase the risk of smoking, and adolescents with asthma who smoke are more likely to have major depression and anxiety disorders compared to non smokers (Bush et al., 2007).

Again, peer influence is important, because the strongest predictor of smoking is having at least one close friend who is a smoker, as reported by adolescent smokers (Zbikowski, Klesges, Robinson, & Alfano, 2002), although parents and social norms exert influence too (Islam & Johnson, 2005). Other predictors of smoking, as perceived by adolescent smokers, include a positive attitude toward smoking, low self-efficacy to resist smoking, high perceived smoking prevalence, and low-risk perception of smoking (Islam & Johnson, 2005; Van de Ven et al., 2006). In adolescents with asthma, it has been suggested that both high smoking prevalence and low self-efficacy to quit smoking are related to the role of negative peer pressure in adopting risky health-related behaviours (Van De Ven, Engels, Otten, & Van Den Eijnden, 2007). Therefore, health care professionals argue that increasing awareness about the adverse health-related outcomes of smoking within the peer context in adolescence is a priority in health-related education and promotion efforts (Clarke, MacPherson, Homes, & Jones, 1986). In fact, peers are willing to help smokers to quit this behaviour (Patten et al., 2004). It is worthwhile to teach adolescents some pressure-resistance and refusal skills to lower their intention of smoking, and this can be achieved through implementing peer-led smoking prevention programs (Bush et al., 2007; Carlsen & Lodrup Carlsen, 2005; McAlister et al., 1979; Van De Ven, Engels, Otten et al., 2007; Van de Ven et al., 2006). This is particularly important in developing countries, where appropriate adolescent smoking prevention programs are limited (Islam & Johnson, 2005). Furthermore, most of the literature reviewed, while methodologically sound, were not conducted in Middle Eastern countries and may not reflect the issues that occur in that context. Regardless, preventing smoking in adolescence is a key step in minimising smoking in adulthood (Van de Ven et al., 2006).

Based on the literature provided in both Chapters One and Two regarding adolescent asthma, particularly in Jordan, the study in this thesis seeks to answer the following question: “Does a school-based peer-led education program aimed at adolescents with asthma improve asthma-related quality of life, knowledge of self-management of asthma, and self-efficacy to resist smoking, compared to usual asthma care in high school students in Jordan?”

2.8 Summary

To conclude, asthma is prevalent in adolescents globally as well as the Middle East region. Asthma can have a serious negative impact on adolescents' daily lives if managed inappropriately. Some of this impact is emotional, which then has an impact on their self-care, with adolescents experiencing embarrassment about using medications in front of peers, fear of unpredicted symptom exacerbations in schools, and lack an understanding of the chronic nature of asthma. The assumption of self-management of asthma by adolescents can be both a window of opportunity or problematic because of the developmental changes occurring. As adolescents with asthma are likely to rely on and seek peer acceptance, utilising peers in implementing health-related education programs, particularly in the school setting, could lead to better health-related outcomes. Such programs promote and sustain behaviour change for optimal self-management (Ayala et al., 2006; Cohen et al., 2003; de Benedictis & Bush, 2007; Elliott, 2006; Jones, 2007).

Chapter Three - Peer-Led Asthma Education Programs in Schools

3.1 Introduction

This chapter discusses a program called "Adolescent Asthma Action (Triple A)", which corresponds with the recommendations for effective programs to support adolescents with asthma developed in Chapters One and Two but substantiated in this chapter. Triple A involves training senior students to educate younger adolescents about asthma. The program incorporates educational principles, focusing on using peer pressure, behaviour modelling, and empowerment in order to enhance adolescents' self-efficacy to self-manage. Triple A has been found to be effective in improving several health-related outcomes, including quality of life, through randomised, controlled trials in Australian high schools (Gibson, Shah, & Mamoon, 1998; Shah et al., 2001). In light of the program's demonstrated success, the program has been implemented in high schools across Australia (Shah, 2003).

Peer-led programs are relatively rare worldwide, and in Jordan there are few peer health-related education programs targeting health-related issues in adolescents. The few programs that do exist in Jordan have not been rigorously designed or evaluated for their effectiveness in achieving health-related outcomes or promoting self-management in adolescents (UNICEF, 2004). However, the existence of a few peer-led education programs in Jordan at least creates the potential for the acceptance of Triple A and similar well-designed programs for adolescents.

3.2 Recommendations for Adolescent Asthma Interventions

The developments in adolescence and associated barriers to adequate self-management mentioned in Chapter Two have led asthma researchers to suggest several key components for educational interventions for adolescents with asthma in order to ensure optimal health-related benefits (Berg, Tichacek, & Theodorakis, 2004; Boyer, Sieverding, Siller, Gallaread, & Chang, 2007; Kintner, 2004; Kyngas, 2003; Perez,

Feldman, & Caballero, 1999). These elements include: a) incorporation of well-established theories and principles, such as self-efficacy, in order to improve knowledge, skills, and feelings of control regarding symptom self-management (Clark & Valerio, 2003; Kintner, 2007), b) consideration of adolescents' unique needs by actively involving peers within the school context to increase their asthma awareness and support their asthmatic peers (Cohen et al., 2003; Gibson et al., 1998; MacDonald, 2003; Sin, Kang, & Weaver, 2005), c) a focus on how to empower adolescents with asthma to avoid smoking (Bush et al., 2007; Van De Ven, Engels, Otten et al., 2007), and finally, d) the development of creative learning and teaching activities, such as group discussions, problem-solving strategies, and social skills training that together further improve self-efficacy and enable adolescents with asthma to self-manage their condition adequately (Tobler et al., 2000; Velsor-Friedrich et al., 2004).

The use of the peer-led approach in Triple A is likely to produce better health-related outcomes than those seen in traditional non peer-led asthma programs. There is mixed evidence from relevant systematic reviews about the effectiveness of traditional adult-led asthma education programs (Bhogal et al., 2006; Smith et al., 2005; Wolf et al., 2003; Yorke et al., 2005). As these programs often group adolescents with children in reports, it is hard to determine their effects on this specific age group. In addition, these programs are often designed for children, and thus may not take into account adolescent needs, development or preferences. For example, programs originally aimed at children may not recognise the expansion in cognitive and learning ability, the need for independent decision-making that occurs in adolescence (Ayala et al., 2006; Paus, 2005; Steinberg, 2005), or the need for establishing a self-identity which incorporates their condition without feeling dissimilar to other healthy peers (Gettlinger, 2003). Triple A recognises these factors by acknowledging and incorporating the importance of peers (Cohen et al., 2003) and the school context (Evans et al., 2001) in asthma education.

Aside from Triple A, a review of the literature indicates that relatively few school-based asthma programs were developed exclusively for adolescents (Berg et al., 2004; Bruzzese et al., 2004; Bruzzese et al., 2008; Shaw, Marshak, Dyjack, & Neish,

2005; Valeros et al., 2001). However, these programs use health professionals rather than peers as educators and positive findings have been reported regarding asthma-related knowledge, self-management skills and quality of life from pilot tests of these programs (Berg et al., 2004; Bruzzese, Unikel, Gallagher, Evans, & Colland, 2008; Bruzzese et al., 2004; Shaw et al., 2005,). However, to the best of the researcher's knowledge, results of full testing by randomised controlled trials have yet to be reported, so the evidence for their effects is not conclusive. Interestingly, one of these school-based adolescent interventions (Bruzzese et al., 2008) targeted caregivers and involved them in the program. This family-based intervention led, through a randomised pilot trial, to better family relationships and health-related outcomes, highlighting the vital role of family participation in preparing adolescents with asthma to become more responsible and independent for their self-management. Thus, Triple A was chosen to test for this thesis because it meets recommendations most fully and has undergone thorough evaluation, including a randomised controlled trial.

3.3 The Adolescent Asthma Action (Triple A) Program

The intervention in this thesis is an adaptation and implementation of the Triple A program, which was developed by Shah in 1993 in Australia. As noted earlier, Triple A is a peer-led education program that involves senior students educating younger peers about asthma and smoking through a three-step implementation process in high schools (Shah, 2003; Shah, Mamoon, & Gibosn, 1998). The aims, objectives and process outcomes of Triple A are illustrated in Table 1.

Table 1 Aims, Objectives, and Process Outcomes of the Adolescent Asthma Action (Triple A) Program

Aims

1. Create a supportive school environment for asthma
2. Decrease asthma emergencies in the school
3. Promote asthma awareness in the school community
4. Prevent smoking

Program objectives

1. Use asthma reliever medications when required
2. Take preventive action to avoid exercise-induced asthma
3. Recognise signs of worsening asthma
4. Understand the need to see a doctor for their asthma
5. Comply with the daily use of preventer medications

Educational objectives

1. Increase knowledge of asthma and its management
2. Promote positive attitudes towards asthma
3. Promote avoidance of smoking and passive smoking
4. Identify the steps to take in an asthma emergency

Process outcomes

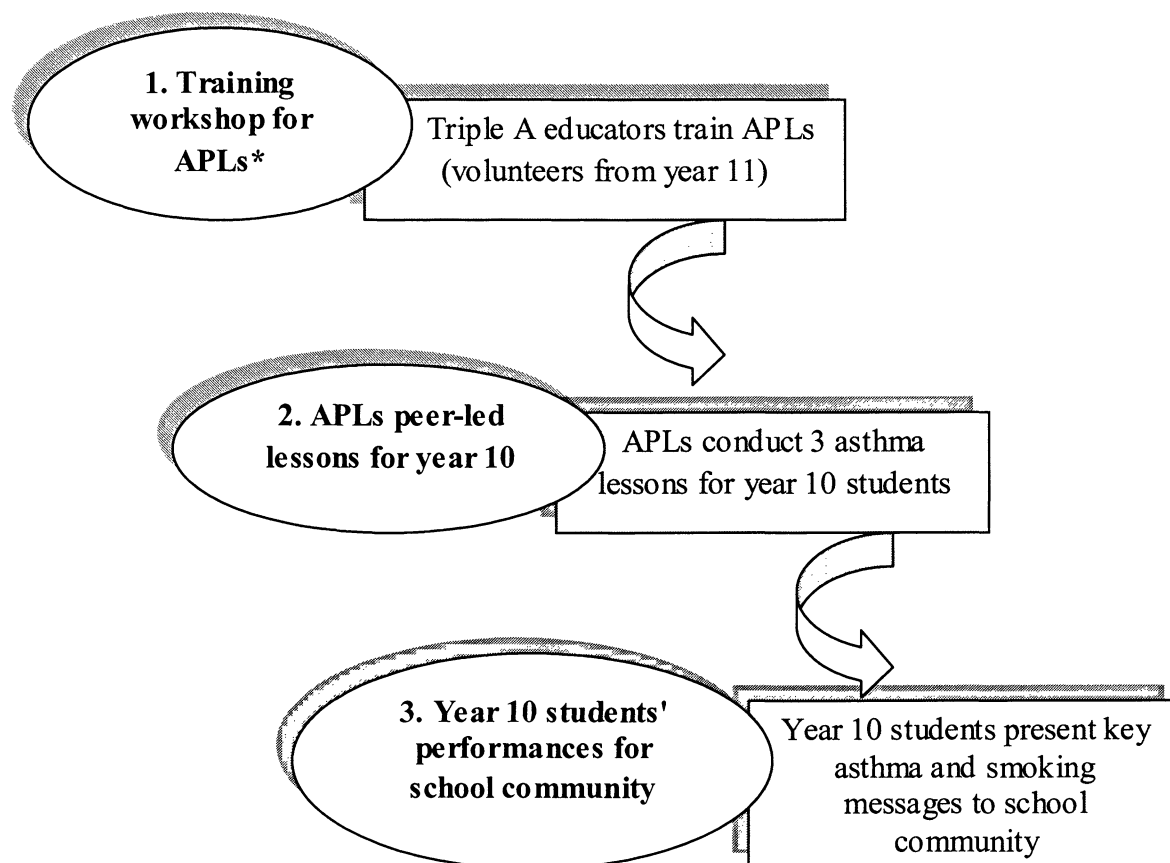
1. Promotes social responsibility and leadership
 2. Enhances collaborative group work skills
 3. Offers opportunities to participate in community action
 4. Builds friendships
-

In the first of the three steps of Triple A, educators, who are usually trained health professionals, train a group of senior students, who are ideally volunteers from year 11, as Asthma Peer Leaders (APLs) during a one day workshop held at the students' school. During this workshop, year 11 students learn about asthma and its management through various creative learning and teaching activities, and gain skills in leadership and group facilitation. In the second step, groups of these trained APLs

conduct three interactive asthma lessons for younger peers from year 10 to teach them about asthma management, using a standardised training manual developed specifically for the program. In the third step, year 10 students convey what they have learned in the asthma lessons into short and simple messages about asthma and smoking delivered in a fun and creative manner through performances, including songs, drama, debates, and music, which are presented to the school community during a school assembly (Shah, 2003). This three-step implementation strategy creates a cascade through peer involvement, thus helping to further distribute asthma and smoking messages widely, as illustrated in Figure 1.

The three steps of the program incorporate interactive learning and teaching activities shown to be important for adolescent education programs earlier in this chapter (Cuijpers, 2002; Tobler et al., 2000). Several activities, such as group discussion, sharing adolescents' own experiences, and role-playing within peer groups are all used to initiate and maintain behaviour change in adolescents. Such interactive teaching and learning strategies motivate adolescents to change their knowledge, behaviours, and attitudes related to their own health (Story et al., 2002). Many of these activities are theoretically grounded and aimed at promoting key asthma and smoking messages within the school context.

Triple A also contains a number of resources to facilitate program implementation. These include standardised training manuals for senior students to be peer leaders and for health care professionals to be Triple A educators, a video with three educational short films introducing asthma and Triple A and focusing on asthma self-management and emergency treatment in schools, airway models showing the physiological effect of asthma on the airway, placebo asthma medications, and asthma drug devices. Most of these resources, including the training manuals and the videos, can be downloaded free of charge from the program website (<http://triplea.asthma.org.au>). Hard copies of the videos/DVDs are \$AUD35 each.



* APL means Asthma Peer Leaders

Figure 1 Three-step implementation model of the Triple A program

Theoretical framework of Triple A. The framework of the Triple A program is based on the assumption that adolescent asthma self-management in schools is influenced by adolescents' knowledge, attitudes, behaviour modelling, and peer pressure within the school environment (Shah & Cantwell, 2000). The approach used in the program focuses on providing education and support for adolescents with asthma and their peers using principles that are universally applicable, such as human agency and self-efficacy (Bandura, 1977, 1984), and empowerment (Freire, 1970; Freire & Reynolds, 1993; Wallston & Wallston, 1984). Additionally, important aspects of program planning including the development of aims and objectives were inspired by Green's Health Planning Model (Green, Kreuter, Deeds, & Partridge, 1980). The

incorporation of these principles in the design of the Triple A model is described below (

Figure 2).

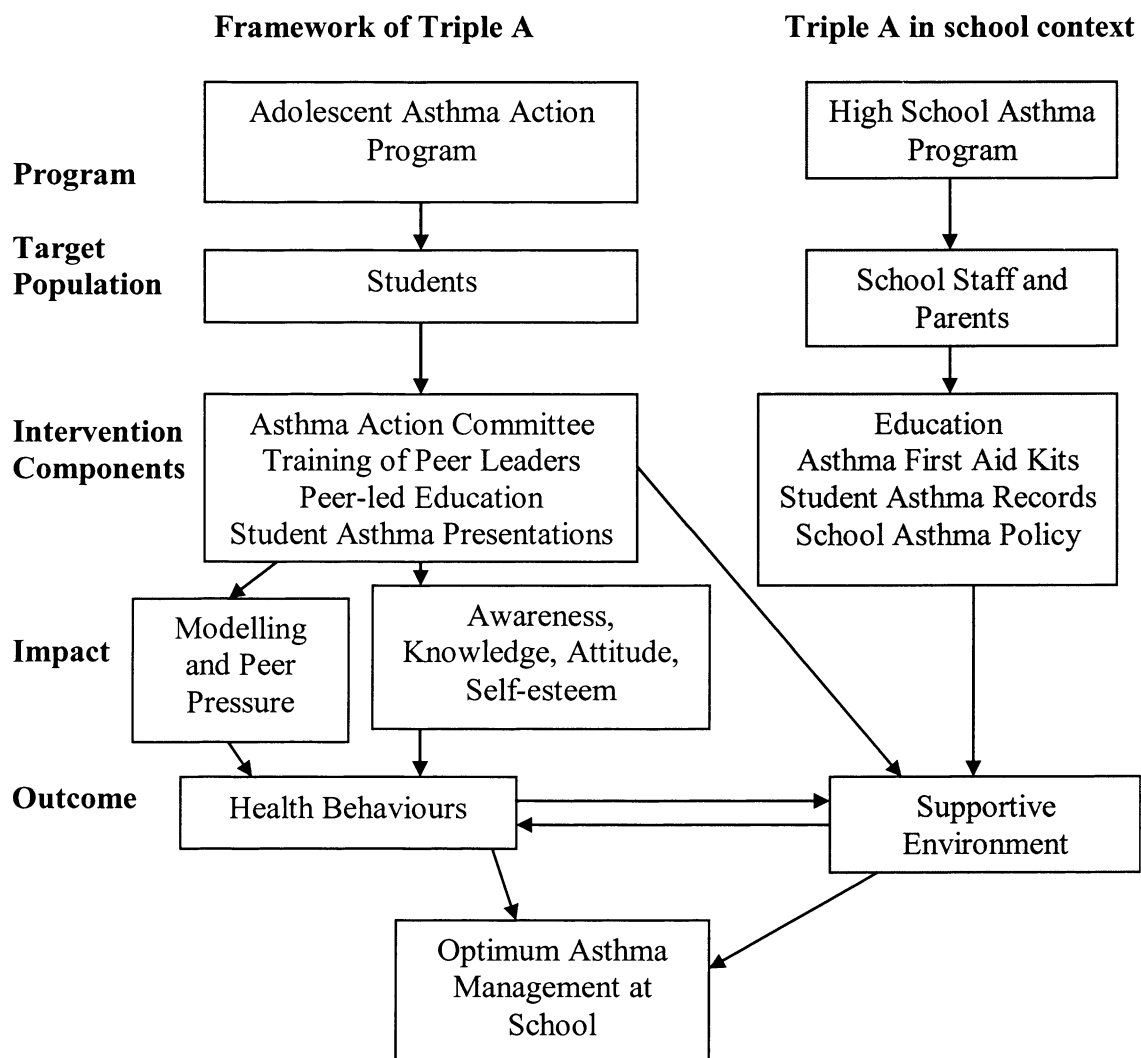


Figure 2 Framework for the Triple A model (Shah & Cantwell, 2000)

Social Cognitive Theory. This theory (Bandura, 1986) explains individuals' attainment and maintenance of new behaviours through self-efficacy and outcome expectations, and is therefore closely attuned to adolescent asthma, because accomplishing and mastering positive self-management behaviours results from high

self-efficacy (Clark et al., 1988; Shah, Gibson, Wachinger, Kary, Halliday, 1995). Bandura (1986) explains that human behaviour results from an ongoing mutual interaction of cognitive, behavioural, and environmental determinants. In particular, self-efficacy is a key construct that predicts the individuals' ability to adopt healthy behaviours. Self-efficacy is the degree of confidence an individual has to perform certain behaviours in various contexts by exercising some measure of control through visualising the consequences of this behaviour (Bandura, 1986). In terms of asthma, by improving the degree of confidence students with asthma have in their ability to manage their condition, the chance of taking positive outcome actions, such as adhering to medications, will be increased.

The role of self-efficacy in achieving positive health-related outcomes in adolescents with asthma has been confirmed (Schlosser & Havermans, 1992). Adolescents with asthma can enhance self-efficacy to manage their condition through four sources: performance accomplishment or mastery, vicarious experiences, verbal persuasion, and emotional arousal (Bandura, 1977). Mastery occurs when adolescents with asthma perform a certain task related to self-management successfully based on their past success of similar tasks. Vicarious experience is the experience gained and skills acquired by watching other students with asthma performing a certain skill, and it is usually called social modelling or observation. Verbal persuasion occurs when adolescents with asthma are encouraged to do a certain task that leads to optimal self-management and are reminded of their ability to succeed in this task. Finally, emotional arousal is when emotions impact the perception of adolescents' personal ability to adopt a certain health-related behaviour, thus there is a need to learn how to minimise stress and negative emotions and elevate positive feelings in order to increase one's sense of self-efficacy (Bandura, 1977), and therefore better self-management. Triple A incorporates several of these strategies. Overall, the strongest influence on self-efficacy is mastery, as it induces the performance of appropriate self-management behaviours and skills, and thus the experience of the subsequent relief from symptoms (Bandura, 1997).

The second key factor influencing adolescents' adoption of healthy-related behaviours is outcome expectations. These expectations are the anticipation of the effectiveness of asthma treatment and related skills (Bandura, 1984). Moreover, for adolescents with asthma, positive outcome expectations are the perceived benefits that will result from avoiding cigarette smoking or adhering to their asthma medications regimen, such as experiencing fewer symptoms and attacks. In contrast, negative outcome expectations relate to the perceived costs or difficulties that result from adopting healthy behaviours, such as side effects, embarrassment, feeling different from their peers, or the high costs of asthma medications. Most importantly, adolescents with asthma need to learn how to balance their perceived benefits and risks to engage in self-management more effectively.

Social Cognitive Theory principles are incorporated in the program because self-efficacy has been demonstrated to lead to mastery and performance accomplishment. Previous reports have shown that accomplishing and mastering positive asthma self-management behaviours often results from high self-efficacy (Clark et al., 1988; Shah et al., 1995). In particular, self-efficacy to resist smoking is important to develop motivates avoidance of cigarette smoking (Heale & Griffin, 2009), an important asthma trigger (Van De Ven, Engels, Otten et al., 2007). This is particularly important for Jordanian students, who live in a community that has high prevalence of cigarette smoking (Haddad & Malak, 2002). The direct relationship between active or passive smoking and asthma severity (Cook & Strachan, 1997; Doll et al., 1994) makes education that aims at improving self capacity to avoid smoking very important in Jordan.

Researchers have recommended incorporating these principles into adolescent education programs by using peers because of the credibility of peers as role models and the continued social contact during and after school (Green, 2001; Milburn, 1995; Turner & Shepherd, 1999; Zebracki & Drotar, 2004). This contact allows for ongoing social verbal persuasion and vicarious experiences through message reinforcement and behaviour modelling. This means that the effects of Triple A should be sustained beyond the program time. The Triple A program incorporates the four sources of self-

efficacy as well as human agency, where individuals are not passive and can be proactive in managing their health. These principles are applied through role play, the educational films in the Triple A video, group discussion, and problem solving techniques, in which students gain knowledge and experience by performing tasks themselves or through watching peers' role modelling behaviour (Shah, 2003) (

Figure 2), page 38.

Freire's Empowerment Education Approach. The empowerment education approach (Freire, 1970) is also used because it is an effective health education and prevention approach for personal and social change (Wallerstein & Bernstein, 1988). According to Wallerstein and Bernstein (1988, p. 170) empowering is “a social action process that promotes participation of people, organizations, and communities in gaining control over their lives in the community and larger society”. This strategy is effective because it motivates people and facilitates appropriate and socially accepted behaviours and decisions, and is therefore particularly relevant for adolescent asthma.

Students with asthma tend to improve their knowledge about asthma management when they engage in groups and interact actively with other peers rather than passively receiving information from adults. Thus, adolescents gain asthma-related knowledge and skills when adolescents with asthma share their experiences and understand the condition that impacts the quality of their lives (Freire & Reynolds, 1993). Therefore, an appropriate educational approach should elicit knowledge and responses from adolescents with asthma, which Freire called the “problem-posing” method.

Freire's model uses a 3 - stage methodology, which involves firstly listening to the important issues that most concern adolescents with asthma within the school context, secondly, using “problem posing methodology” in an active participatory dialogue, and finally, the action which results from dialogue and leads to effective self-management (Wallerstein & Bernstein, 1988). According to this methodology, students with asthma are active participants with health care professionals, who should discuss

available asthma treatments with adolescents, consider their preferences and lifestyle, and modify these treatments according to their own needs, experiences, and concerns (Wallerstein & Bernstein, 1988). As a result, empowerment makes adolescents with asthma a) more responsible for their own condition, b) actively engaged as educators and facilitators through self-managing asthma, c) more understanding of the chronic nature of asthma, and d) able to participate in treatment plans that aim at meeting their needs improving quality of life (Freire & Reynolds, 1993).

Freire's approach indicates how vital it is to empower adolescents, especially those with chronic diseases to take control of their health in familiar contexts, such as schools and by targeting peer groups. Through disseminating asthma messages for the whole school community, the empowerment approach in Triple A enables students with asthma to feel more supported, accepted by, and similar to, their healthy peers, therefore improvement in emotional quality of life is likely to occur (Burkhart et al., 2009). Previous reports suggest that both empowerment and social support are positively associated with self-management behaviours (Cohen et al., 2003; Hennessy-Harstad, 1999; Perry & Grant, 1988; Sin et al., 2005; Zebracki & Drotar, 2004). Therefore, this approach was incorporated in the intervention part of Triple A through the concepts of knowledge, peer pressure and empowerment (Shah, 2003; Shah & Cantwell, 2000). For example, several activities in Triple A motivate and enable adolescents to spread messages about asthma management within the context of peer culture, using for example, shared problem-solving and group discussions (Shah et al., 1998).

Green's Health Planning PRECEDE model. Green's Health Planning model (Green et al., 1980) was adopted in the planning phase (designing the model and objectives) of the Triple A program. This is also known as the PRECEDE model: predisposing, reinforcing and enabling causes in educational diagnosis and evaluation (Green et al., 1980). PRECEDE provides a framework for developing and evaluating health-related education programs. According to this model, the health-related education program that is perceived as the most needed is an intervention for an already detected problem, such as asthma, in a group of people. Contention is similar to that

seen in Freire's problem-posing education as discussed earlier in this chapter. An underlying basis of this model is that health-related education is dependent on the voluntary assistance and involvement of the individual in a process that relies upon personal determination of behavioural practices. Accordingly, the degree of change in knowledge and health-related practice in an individual is directly related to their degree of active participation.

In accordance with this model, Triple A targeted the school environment as the place for applying the program and reinforcing and enabling voluntary assistance of school staff and students (Adolescent Asthma Action Project 1993-2000 Final Report, 2001). Additionally, based on Green's model, Triple A assumes that students assess the behaviour as desirable, have the resources and skills to practice that behaviour and are supported by school in order to promote asthma self-management (Shah, 2003, p. 6).

Overall, the theories incorporated in the Triple A intervention are clearly related and focus on developing the power of the individual within a social peer group. The next section, therefore, provides evidence of the effectiveness of Triple A using evidence from randomised, controlled trials conducted in Australia.

Evaluation of Triple A. The Triple A program has been found to be effective in improving asthma-related quality of life and asthma knowledge, and reducing asthma morbidity and school absences among adolescents with asthma (Shah et al., 2001). Triple A has been rigorously tested through formative, process, and impact evaluations in several rural and urban high schools within Australia (Gibson et al., 1998; Shah et al., 1998; Shah et al., 2001).

Shah and her colleagues (1998) first piloted the program in a high school at Auburn, a multicultural suburb in Sydney, Australia. In this study, the APLs reported that the three training workshops were interesting and increased their knowledge, confidence, and awareness of asthma (Shah et al., 1998). The year 10 students, who were taught by the year 11 APLs, stated that the peer-led approach was very effective

in increasing their awareness of asthma management and cigarette smoking in a simple and fun way. After the successful pilot, the program was tested further using a cluster randomised controlled trial in two girls' high schools in Auburn also. Students in the intervention schools improved their asthma knowledge 10% more than baseline ($p < 0.0001$) in comparison to no change in the mean asthma-related knowledge in the control school ($p > 0.05$). Interestingly, students both with and without asthma increased their knowledge, indicating that the program was beneficial not only for students with asthma but to their peers as well. However, the program did not significantly alter asthma-related quality of life. One explanation for this may be that baseline measurements in participating students indicated only mild impairment of quality of life. Moreover, the authors acknowledged that the sample size was probably inadequate to detect an effect, as only 92 participating students have asthma (study power = 69%). Another explanation may be due to the short period of follow up (two months), which may not have allowed sufficient time for quality of life to change.

These limitations were addressed by testing on a larger sample size to ensure appropriate power, which necessitated using a cluster randomised controlled trial of six high schools in Tamworth, a rural town in the state of New South Wales. The cohort of 1515 students from year 7 and 10 classes contained 272 students with asthma or recent wheeze (Shah et al., 2001). This study reported a significant improvement in the mean total quality of life scores (> 0.5 units) in 25% of students with asthma in the intervention schools ($p < 0.01$) compared to only 12% of students with asthma in the control schools after a three-months follow up period (Shah et al., 2001). Overall, this study showed that eight students need to be educated for a student with asthma to report a clinically important improvement in quality of life (95% confidence interval = 4.5 - 35.7) (Shah et al., 2001). Importantly, the researchers reported a significant decrease in the median number of days absent from school in year 10 students in the intervention schools (8 versus 5 days), with no significant difference in the control schools (5.5 versus 4 days).

In total, Triple A proved effective by significantly improving asthma-related quality of life and reducing asthma-related school absences among high school students

in Australia (Shah et al., 2001; Shah, Roydhouse, & Sawyer, 2008a). Triple A was also feasible in Australian high schools and it was well-received by adolescents and school staff (Shah et al., 1998). As the principles of the program are universally applicable, it may be suitable for Jordanian adolescents, as described in the next section.

3.4 Adapting Triple A for Students in Jordan

There are many reasons for a program such as Triple A to be successful in Jordan. The success of the adolescent peer-led educational programs that use well-established principles suggests that Triple A could be similarly successful in Jordan. Moreover, the Ministry of Education in Jordan aims to provide a proper health care through suitable and effective health-related education, particularly when it results in changes in students' health-related behaviour and has a positive impact on the families and environment in which those students live (Ministry of Education, 2004a). These aims are consistent with the aims and theoretical basis of Triple A, in which asthma and smoking messages are likely to change students' behaviour and be disseminated to families and the wider community through the ripple effect of the program (Evan, Clark, Levison, Levin, & Mellins, 2001). Importantly, breathing and respiratory diseases and prevention of smoking are the main topics for health-related education in the Jordanian schools (Ministry of Education, 2004a).

As the majority (85%) of adolescents worldwide live in developing countries (WHO, 2004), adolescent health in these countries should be a global priority. In Jordan, for example, adolescents (10-19 years of age) form nearly a quarter (23%) of the estimated population, while youths (15-24 years of age) constitute about one third of the population (DOS and Macro International Inc., 1997). This means that more than half of the total Jordanian population is under the age of 24 years and therefore their health status is very important (Al Wakeel, 2002). However, the Jordanian government does not use clear or consistent definitions of adolescents, and in the past adolescents have been largely neglected by policies and programs (Almasarweh, 2003). Therefore, UNICEF (2001) recommended that programs exclusively targeting adolescents' health-related behaviours and skills should be developed and implemented in Jordan.

In Jordan, there is also a high prevalence of adolescent smoking, which has likely resulted from a combination of factors, including the negative effects of peers and behaviour modelling (Haddad & Malak, 2002). About one-fifth (20.6%) of Jordanian adolescents, defined as 10-19 years of age in this study, are smokers, and this prevalence is continually increasing (WHO, 2000). Importantly, youth smoking is even higher, when youth is defined as 15-24 years of age, at 28.6% in Northern Jordan were smokers (50.2% among males and 6.5% among females) (Haddad and Malak, 2002). This level of smoking is very high in comparison to most developed countries (White & Hayman, 2006). Thus, a peer-led intervention to minimise smoking prevalence and change peer culture regarding smoking behaviour is urgently required (Bush et al., 2007; Clarke et al., 1986; Otten et al., 2007). Given the high rates of adolescent and adult smoking in Jordan, actively involving adolescents as change agents in smoking cessation programs could be an innovative public health strategy that could have a ripple effect in reaching many smokers in school, home, and the wider community (Patten et al., 2004). Clearly, there is an overlap between the definition of the two age groups of adolescence and youth. In this thesis we define adolescence as being between 10 to 19 years. In addition, the smoking status in this thesis will be divided into two main groups; smokers and non smokers, while recognising that smoking includes people who have never smoked, infrequent, frequent and regular smokers.

However, adolescents in Jordan need to have a more active role into decisions that affect their health, and this has not been a priority of the government. These needs were demonstrated in a Youth Survey conducted in 2001, which identified that almost all (86.7%, of males, and 89.7% of females) adolescents wanted more participation in decision-making processes that concern their life and health, (UNICEF, 2001), therefore the Triple A program appears suitable for addressing the unmet public health needs of Jordanian adolescents with respect to asthma. So it is not surprising that recently, adolescent peer education programs have become more common in Jordan, but there are still limitations regarding the selection of peer leaders. For example, a project called “Youth to Youth for Safe RH” used trained peer leaders to develop and implement awareness-raising activities for other peers regarding sexual and reproductive health (JNPC/GS, 2001). However, the study used a teacher selection

approach in which teachers chose peer leaders on the basis of academic achievements and talent, instead of the recommended techniques of voluntary participation or peer nomination (Audrey et al., 2008; Sussman et al., 2007), which are more likely to be effective. This is an important issue as peer leaders' recruitment is seen as vital in the program success (Green, 2001; Ochieng, 2003). Other health issues targeted by peer-led education programs in Jordan include adolescent smoking. For example, a peer-led 'No Smoking in School' campaign was conducted to target students between 13-15 years of age in schools in central Jordan, including the capital, city of Amman (UNICEF, 2004). This program was effective in increasing awareness of smoking hazards among adolescents in Jordan, who were eager to help someone close to them to quit smoking.

Previous experience with peer-led programs in Jordan may thus make Triple A more likely to succeed in Jordanian schools. Furthermore, Triple A may be particularly suitable for Jordan as the program was originally developed for high schools in Auburn. This suburb is a low-socioeconomic status suburb in Sydney, with a significant non-English speaking population. As a large proportion of this population is comprised of migrants from Middle Eastern countries, including Jordan (Australian Bureau of Statistics, Census of Population and Housing, 2006), the program may already contain elements which are culturally appropriate for an Arabic-speaking population. Moreover, the active use of information and cognitive-behavioural techniques within the peer culture can improve knowledge and self-management abilities regardless of the cultural context (Barnes & Chapman, 1994; Perez et al., 1999; Price, 1996). This affirms that the principles behind using peers in education programs for adolescents with asthma should be effective across a range of ethnic or socioeconomic backgrounds.

Nevertheless, there are some challenges that might limit the potential of Triple A to be successful in Jordanian schools. One of these challenges is that the educational curriculum in some Jordanian schools does not focus on creative thinking or interactive teaching and learning activities (Ministry of Education, 2004a). Another important potential challenge is the language difference, as the official language is Arabic in all

Jordanian schools and all the Triple A resources are in English. However, the Ministry of Education introduced condensed English classes from the first grade (year 1) to all government schools in 2004 (Ministry of Education, 2004b), and health care professionals have sufficient English proficiency to understand the Triple A resources including the Triple A educational video and the training manuals that were previously described in this Chapter.

3.5 Summary

There is evidence that Triple A, a school-based, peer-led education program that incorporates well-recognised theories can enable and support adolescents to achieve better health-related outcomes, including improvement in the quality of life and asthma-related knowledge. Such a program is especially important for adolescents in Jordanian high schools, as there is a high prevalence of smoking, lack of effective asthma health-related education programs and access to published guidelines for health professionals. While it is promising, there is still a need to test Triple A, in a pilot study prior to implementing it in high schools in Jordan. The next chapter therefore describes the process evaluation of Triple A in Jordan in depth.

Chapter Four - Process Evaluation of Pilot Phase of Triple A in Jordan

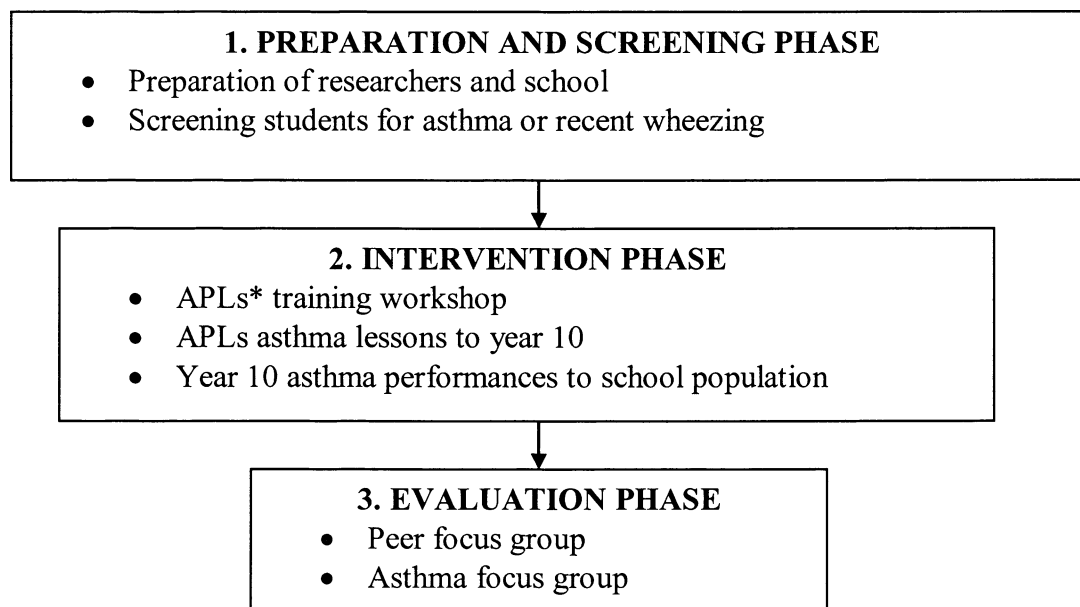
4.1 Introduction

This chapter includes a description of the process evaluation of pilot phase of the Triple A program (the intervention) in Jordan. It describes the methods used in the three different phases of the pilot, and provides the evaluation of each phase. Detailed description of the instruments used in data collection, and the process of collection and analysis are also provided. Discussion occurs of the implications and modifications to the Triple A developed in response to the results and related resources for the main study, which follows in Chapter Five.

The major aim of this process evaluation was to determine whether the Triple A program was needed, feasible in the school setting, accepted by students and teachers, and could be successfully adapted to high schools in Northern Jordan. There were concerns that modifications may be necessary, although English language is taught in all public schools from year 5 and in all private schools from kindergarten. Therefore, generally, students are familiar with English, although students in private schools have higher English proficiency levels than those in public schools. However, Arabic is the main language, also, most high schools in Jordan are single sex schools, which may affect the program. Finally, as the intention was to conduct a randomised controlled trial (RCT), the pilot assisted in determining the prevalence of adolescent asthma and recent wheezing in the last 12 months, as a basis for determining the sample size.

The pilot study was conducted over three phases, which are described in Figure 3. Phase 1 included training for the researcher and research assistants in the program, as well as preparation of the school, and screening of students to identify those with asthma and this phase is detailed in Figure 4 (page 58). Phase 2 involved the implementation of the three steps of Triple A, which is detailed in Figure 5 (page 63). Phase 3 included the process of conducting two focus groups to help determine the specific needs of adolescents with asthma in Jordan outlined in Figure 6 (page 68).

Journal notes were kept by the researcher, detailing personal reflections and observations during the three phases of the pilot and these were incorporated into the evaluation.



**APLs means Asthma Peer Leaders*

Figure 3 Phases of the process evaluation of Triple A in Jordan

4.2 Setting

A private school for girls (n = 240) in the Irbid region, Jordan, was selected for the pilot. In this school, teachers are the most dominant and active force inside the classroom. The school was selected because of its convenient location and because it was the second largest high school in the local district, in which the student population was generally representative of the geographic and socioeconomic backgrounds of the schools in Northern Jordan. There is the potential that the gender of the students may impact on the process of the Triple A, and careful consideration of these effects was recorded in field notes and the potential implications for the main trial. It is almost impossible to avoid the effects of gender as almost all high schools in Northern Jordan are unisex. Students in years 7, 8, 10, and 11 were targeted for this study, consistent with previous studies that implemented Triple A in high schools in Australia (Gibson et al., 1998; Shah et al., 2001). Ethics approval from both the Ministry of Education in

Jordan (Appendix A), and UTS Ethics Committee in Sydney, Australia (Appendix B) was sought and obtained in late August 2006, prior to conducting the study.

4.3 Methods

Instruments. All instruments reported in this section (Appendix C) were used in both the pilot study and the main study.

Core Questionnaire for Wheezing and Asthma (CQWA). Eligibility of students and the prevalence of asthma and wheezing was measured using the Arabic version of the CQWA developed for the International Study of Asthma and Allergies in Childhood (ISAAC), specifically the written questionnaire, phase one for 13-14 years old (Asher et al., 1995) (Appendix C). The CQWA collects information on the presence, frequency, and severity of wheezing. The CQWA is self-administered, and contains eight simple questions related to asthma diagnosis, asthma symptoms, and wheezing in the last 12 months. The CQWA provides a simple and valid tool for international comparisons of asthma prevalence and severity (Lai et al., 1997). Therefore, the CQWA was ideal for the current study. Any student who answered "Yes" to question 2 (Have you ever had wheezing/whistling in the last 12 months?) was eligible for recruitment. A valid translated version of the CQWA was selected as it has been used in several parts of the Middle East, such as Kuwait, Saudi Arabia, United Arab Emirates, Oman, and Northern Jordan, to examine the prevalence of asthma and asthma symptoms among children and adolescents (Abuekteish et al., 1996; Al Frayh et al., 2001; Bener, Abdulrazzaq, Debuse, & al-Mutawwa, 1994; International Study of Asthma and Allergies in Childhood (ISAAC), 1998).

The CQWA has been reported to be valid, concurring with the ISAAC Video Questionnaire, and bronchial hyper responsiveness (BHR) (defined as having a provocation dose of inhaled methacholine causing a 20% fall in baseline FEV1 of 7.8 mmol) in school students (Lai et al., 1997; Shaw, et al., 1995). However, the validity of the CQWA varies across different languages and cultures, as some languages do not have an equivalent of wheezing as understood by English-speakers (The ISAAC

Steering Committee, 1998). One example of construct validity of the CQWA was the fair correlations seen between the first two corresponding questions (moderate wheezing at rest and exercise wheeze) in the CQWA and the ISAAC Video Questionnaire, with Kappa indices of 0.44 and 0.43, respectively (Lai et al., 1997). In another study, the ability to predict BHR, as indicated by the Youden's index, was similar between the corresponding questions of the written and video questionnaires, except for 'severe wheeze' which had a significantly higher Youden's index in the video questionnaire (0.44) than the corresponding question in the written questionnaire (0.11, $P < 0.05$) (Shaw et al., 1992). In Shaw's study, the sensitivity and the specificity of the CQWA in relation to the BHR were 0.63 and 0.82 respectively reflecting good validity, and the coefficient of repeatability for the CQWA is 0.50 indicating fair reliability. Furthermore, the CQWA has been validated in Arabic against the ISSAC video questionnaire and when compared to the clinical diagnosis of asthma made by two respiratory physicians (Miller et al., 2007). In this study, the CQWA was reported to be valid in Arabic and it showed higher sensitivity ($p < 0.05$) and greater accuracy than the video questionnaire (Miller et al., 2007). Therefore, Miller and colleagues (2007) suggest that the CQWA is the preferable screening instrument for asthma in the Arabic population.

Most students understood the questionnaire and found it simple and easy to understand. However, some students said that they did not understand two words: *Khareer* (whistling) in question 2, and *deeq nasam* (asthma) in question 6. These two words are mostly used by the Arab community in Oman, where this questionnaire was originally translated. Therefore, these two words were replaced by two words that are commonly used in Jordan: *Safeer* in question 2, and *Rabu* in question 6. With this adaptation, the Arabic version of the CQWA was suitable for the RCT.

The main survey for students with asthma included three questionnaires (Appendix C), which are described in this section. These questionnaires are: the Paediatric Asthma Quality of Life Questionnaire (PAQLQ), Asthma Knowledge Consumer Questionnaire (CQ), and the Self-Administered Nicotine Dependence Self-Efficacy Sub Scale (SANDSES). These three study outcome variables (quality of life,

asthma-related knowledge, and self-efficacy to resist smoking) were selected based on their known relationship with asthma self-management, which is the ultimate objective of the Triple A program. Appropriate self-management affects asthma related quality of life, depends on the degree of asthma-related knowledge and self-efficacy to resist smoking. However, the primary outcome measured was asthma-related quality of life firstly because it is a reliable indicator of the level of asthma self-management and overall well-being, as perceived by the individual (Juniper et al., 1996; Juniper, Guyatt, Feeny, Griffith, & Ferrie, 1997; Sapp, 2003; Townsend et al., 1991). Secondly, quality of life is important to adolescents because asthma symptoms can negatively affect every aspect of their daily life (Juniper et al., 1996; Matheson et al., 2002; Okelo et al., 2004; Townsend et al., 1991).

Paediatric Asthma Quality of Life Questionnaire (PAQLQ). Quality of life was measured by the Arabic version of the Paediatric Asthma Quality of Life Questionnaire (PAQLQ) (Juniper et al., 1996). The PAQLQ was used to classify the impact of asthma on children and adolescents' lives in the physical, psychological, and social domains of health (Juniper et al., 1996). The PAQLQ is a self-administered questionnaire, which is easy to understand and fast to complete (Juniper et al., 1997). It was originally designed and developed for children aged 7 to 17 years, who experienced a broad range of asthma severity (Juniper et al., 1996). The PAQLQ contains twenty three items organised in three domains: symptoms (10 items), activity limitations (5 items), and emotional function (8 items). The symptoms domain assesses both frequency and severity of asthma symptoms reflecting the degree of the disease. Three items of the activity domain are individualized (patient-specific), which require the patient to determine the most important three habitual activities that have been disturbed or limited because of asthma. Participants respond using a 7 point Likert scale.

Missing answers may occur in the activity domain and there is an equation to calculate the total activity domain score in this case. Responses in each domain are totalled and then a mean calculated for each domain, with the overall score of the PAQLQ being the mean of the three domain scores. Scores range between 7 (no

impairment) to 1 (most severe impairment) for each domain and for the total score (Juniper et al., 1996). A change of approximately 0.5 in the mean total quality of life score or in a specific domain score is considered a minimal significant effect (Juniper, Guyatt, Willan, & Griffith, 1994). A change in score of approximately 1.0 represents a moderate change, and more than 1.5 is a high, clinically significant meaningful change (Juniper et al., 1994).

The PAQLQ has been shown to be able to discriminate between children with wide degrees of impairments (mild to severe impairments) in quality of life (Juniper et al., 1996). Also, the PAQLQ is sensitive to improvement or deterioration in quality of life over time. The PAQLQ has been translated into more than thirty languages to ensure its suitability and understandability by children as young as 7 years of age (QoLTech.com, no date). While several other valid asthma-specific health-related quality of life questionnaires have been developed for both children and adolescents, the PAQLQ is the choice for population monitoring because it is designed for use across a wide age range of children and adolescents (Australian Centre for Asthma Monitoring (ACAM), 2005).

The PAQLQ has been reported to be valid, concurring with Standard Gamble instrument (measures the value that patients place on their own health state), with a Pearson correlation coefficient of 0.57 for the cross-sectional construct validity and 0.5 ($r = 0.30 - 0.60$) for the longitudinal construct validity (Juniper et al., 1997). The PAQLQ is valid for both evaluative and discriminative purposes by providing a summary of the experiences of children and adolescents with asthma (Juniper, et al., 1997). The PAQLQ has been shown to be reliable (Interclass Correlation Coefficient (ICC) = 0.95) through each of the domains and for each age group (7-10 yrs: ICC = 0.89; 11-14 yrs: ICC = 0.96; 15-17 yrs: ICC = 0.87) (Juniper et al., 1997). The major strength of the PAQLQ is its responsiveness (the ability to detect change) over time ($p < 0.0001$). Interestingly, the PAQLQ is also reported to have high test-retest reliability although the exact lapse of time between retesting has not been clearly reported (Rutishauser et al., 1998, p. 492). The PAQLQ has been used in previous research in Jordan to examine the impact of asthma on quality of life for both children and

adolescents (Al-Akour & Khader, 2008). Finally, the PAQLQ was determined to be simple and easy to understand, therefore, no modifications were made to the Arabic version of the PAQLQ for the RCT.

Asthma Knowledge Consumer Questionnaire (CQ). Asthma knowledge was measured by an Arabic version of the Asthma Knowledge Consumer Questionnaire (CQ) developed by Kritikos and colleagues (Kritikos, Krass, Chan, & Bosnic-Anticevich, 2005). The CQ assesses knowledge of asthma management and asthma medication (Kritikos et al., 2005). The CQ contains 12 true/false items, which were developed from the current National Asthma Council of Australia (NAC) guidelines, and adhere to the latest Global Initiatives for Asthma (GINA) guidelines (Kritikos et al., 2005). The CQ is self-administered, and participants were asked not to respond if they were not sure, or if they did not know whether the statement was true or false (Kritikos et al., 2005). The scores are summed with totals from 0 (no correct answers) to 12 (all answers correct). The CQ is simple and quick to administer, and can be used by both adults and adolescents as young as 13 years old, as it had a Flesh-Kincaid Grade Level Score of 8.1 (Kritikos et al., 2005).

The CQ has been reported to be valid because it differentiates knowledge level of pharmacists versus people without asthma versus people with asthma ($p < 0.001$) (Kritikos et al., 2005). Discriminated analysis between high knowledge-versus low knowledge scores has shown that the CQ predicted the score for 99.3% of the high knowledge group and 87.1% of the low knowledge group (Wilks' Lambda = 0.298, $p < 0.001$) (Kritikos et al., 2005, p. 798). In this study, reliability has also been confirmed, with Cronbach's alpha coefficient of 0.78. Based on this validation study, the CQ can be adapted to different national and international settings, as it is based on similar international asthma management guidelines. To the best of the researcher's knowledge, the CQ has not been used in any published study yet. A translated version was used for the current study and translation of this questionnaire was conducted by an accredited Jordanian translator. Based on the researcher's journal notes together with the students' oral feedback, no modifications were made to the Arabic version of the CQ for the RCT.

Self-Administered Nicotine Dependence Self-Efficacy Sub-Scale

(SANDSES). This questionnaire measures the degree of people's self-efficacy to resist smoking. It is a subscale of the Self-Administered Nicotine Dependence Scale (SANDS) developed by Davis and his colleagues to assess self-efficacy to avoid smoking (Davis et al., 1994). The original version of the questionnaire (SANDS) contains six domains: self-efficacy, social skills deficit, loss of control, consequences of use, social support for smoking, and finally concern for health life style (Davis et al., 1994). The two subscales are Self-Efficacy (SE) and Social Skills Deficit (SSD). However, in this study, only the Self-Efficacy subscale was used because the researcher was interested in examining the degree of students' self-efficacy to refuse smoking, if they were offered a cigarette. SANDSES includes 16 "yes" or "no" items; 10 items measuring self-efficacy and 6 items measuring loss of control in relation to smoking. Scores are summed for a total ranging from 0 to 16 with higher scores reflects more capacity to resist smoking. The SANDS has been translated into Arabic (Alanasari, 2004) and this version is recommended for use among Arab students. Reliability has been confirmed with internal consistency of 0.77 and alpha coefficient of 0.75 (Alanasari, 2004).

Of the 12 students with asthma in the piloting phase, no one was a smoker, so, no one filled out the SANDSES. This is not surprising, because all students were female, and females have a much lower reported prevalence of smoking than males in Jordan. This is likely to be because smoking for females is unacceptable and socially prohibited; therefore they are usually reluctant to report it. However, the researcher encouraged the students to read the SANDSES and comment on the survey and given the feedback no modifications were made to the SANDSES for the RCT.

Demographic and asthma-related symptoms and conditions variables were also measured at baseline through a checklist (Appendix D) because of the potential influence on quality of life, asthma-related knowledge, or self-efficacy to oppose smoking. These variables were age, gender, student and family smoking status, asthma diagnosis, medications, asthma severity, symptoms, asthma-related clinical conditions,

and allergens, which were collected during an interview with the student. It is important to acknowledge that the quality of this data depended on the student's understanding of their condition and situation. The number of school days absent due to asthma symptoms, English proficiency level, and family monthly salary were obtained through the students' records in the school.

Both questions related to number of school absences and monthly family salary were not used for the main trial. Data collected regarding the number of school days absent due to asthma symptoms was not found to be useful because the school records did not show the reason for absenteeism, which could be due to multiple causes. Data collected regarding the monthly salary of the family was also considered unhelpful, because some students were not aware of the family monthly income, therefore, could not provide accurate information. Most students filled out the total survey within 20 minutes, which was acceptable to the school.

Process evaluation. As illustrated in Figure 3 (page 50), the pilot study was conducted over three different phases and these phases are now described.

1. Preparation and screening phase

The aim of this phase was to prepare and train the researcher and the research assistants and school staff to conduct the intervention and to identify students with asthma as illustrated in Figure 4 below.

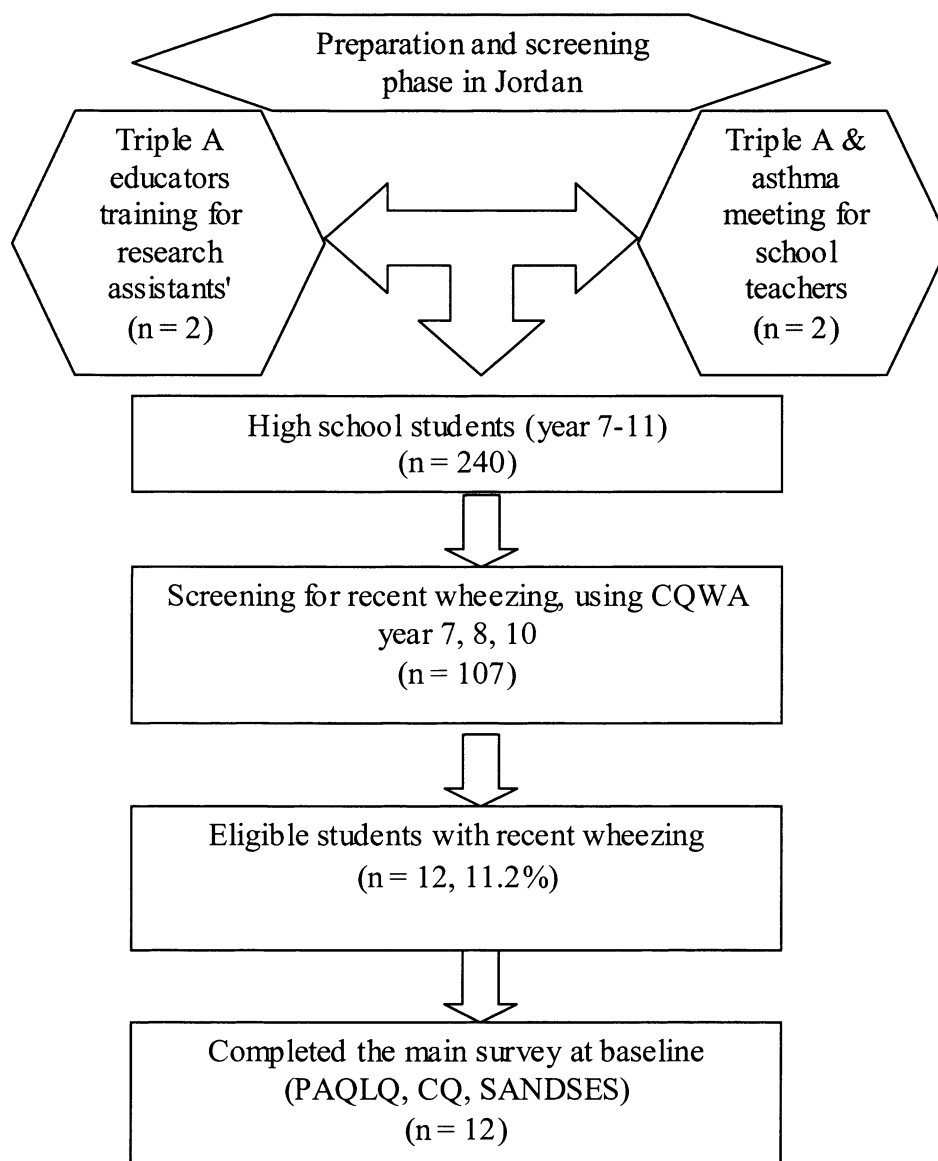


Figure 4 Process of preparation and screening in Jordan

Preparation of trainers and school. The researcher and two research assistants were prepared to conduct the training of students to become Asthma Peer Leaders

(APLs). For the researcher, this preparation included development and presentation of a clinical portfolio on peer-led education, including the Triple A program, as a part of a subject requirement in the Masters of Nursing degree at University of Technology, Sydney. In addition, the researcher was trained intensively over a 12 month period by one to one training with the developer of Triple A, co-facilitating three workshops for medical students from University of Sydney and two workshops for high school students in Sydney 2006. Development included feedback by the developer of Triple A to the researcher to assist her to prepare the program for Jordan.

Two research assistants from a leading university in Jordan were trained by the researcher to be Triple A educators in mid October 2006 during a workshop. These research assistants were members of the Faculty of Nursing, and had intensive experience in training and educating university nursing students in paediatric hospitals in Jordan. During the workshop, the two research assistants were trained to co-facilitate the APL training workshops, and to help in collecting data for the pilot and the RCT. As described in Chapter Three, the educational video describing Triple A was shown to them as well as two more video presentations of key asthma and smoking messages in Australian schools. Each research assistant was given a specially developed training manual for Triple A educators and extensive discussion and feedback was involved. Importantly, the researcher and the research assistants were bilingual and bicultural health care providers, who were well aware of the beliefs and practices of Jordanian adolescents with asthma and their families.

The school principal was contacted by a phone call, and a letter (Appendix E) to introduce the Triple A program, to ask for permission to conduct the pilot study, and to reach agreement regarding the timing of workshops and screening to ensure minimal interference with the teaching and learning process in the school curriculum and inform her about the program and the resources (Shah et al., 1998). Also both the researcher and the school principal signed a Memorandum of Understanding (MoU), which explained the rights and the responsibilities of both parties during the period of the pilot study. Finally, the principal nominated two school teachers to be the liaison for the project. All the Triple A resources were provided by the Health Care Education and

Research Unit (PERU) in Australia including the training manuals, evaluation forms, airway models, asthma devices, asthma first aid kits, straws, dummy cigarette, asthma placebo medications, and the video that includes three short educational films about the program, asthma causes and medications, and asthma management plans in emergencies, particularly within the school context. The researcher also met with the nominated school teachers to ensure their commitment and support for Triple A during the study by increasing their knowledge and awareness of asthma and related emergency management in the school setting and introducing them to the Triple A program and resources (Appendix F). Extra pamphlets were left in the principal's office to give to other interested teachers, who could not attend the meeting.

Ethical considerations. Although there was no health risk anticipated for participating students and school staff during the pilot study, an Asthma First Aid Kit was given to the school at this time to manage asthma exacerbations in case of emergencies. The intervention was programmed not to interfere with the school curriculum and timetable (Shah et al., 1998), and to avoid missing important classes. All the medications used in the Intervention phase were placebo and used only for the purpose of demonstration and training.

All participating students attended regular school classes and eligible students were provided with an information sheet (Appendix G) and consent form (Appendix H) to sign if they, and their parents, agreed to participate in the study. However, the researcher was aware of the cultural issues that might be faced with gaining parental consent because this is not a custom in Jordan. Therefore, the consent process was amended so that if parents told their children they could join the study, the students would then sign the consent form instead of their parents. However, there is no guarantee that the students actually spoke to their parents about being in the study and they may have signed the consent form without the parents' consent. Approval for this amendment was obtained from the UTS Ethics Committee (Appendix I). Signed consent forms were obtained from all eligible students in the three phases of pilot with no refusals, and those students were reassured that they were free to withdraw from the study at any time, and that this withdrawal would not affect their academic status in the

school in any way. Also, the principal was reassured that all data would be coded and kept in a safe locked cabinet, and treated with confidentiality, and students' names would not be released to anyone other than the researcher and her supervisors.

Screening for students with asthma. All students ($n = 107$) were screened for recent wheezing in the last 12 months, using the CQWA, described earlier in this chapter, as detailed in Figure 4 on page 58. Any student who answered "yes" to question two (have you ever had wheezing or whistling in the last 12 months?) was eligible to join the study. Twelve students (11.2%) were found to have recent wheezing and then completed the baseline survey. These data were then edited and coded by the researcher using SPSS Software version 14 (Chicago, Illinois). The sample was then described using means, frequencies and percentages.

It was clear that there is a need for a program like Triple A in Jordan. Firstly, asthma prevalence was higher than previous reports at 11.2% (Abuekteish et al., 1996), but more important, 25% of students with a wheeze did not have a professional diagnosis, only 41.7% reported that were on short-acting reliever medications only (Salbutamol) and no students were on any type of long-acting controller medications, despite one quarter of the sample (25%) having moderate to severe wheezing episodes. Secondly, results showed a high prevalence of cigarette smoking and exposure to passive smoking, with all 12 students reporting at least one smoker in the family; of whom 66.7% were heavy smokers. Thirdly, students had poor asthma knowledge as the students answered about half of the questions incorrectly (mean = 6.83, SD = 0.1). Finally, the majority of students' quality of life was affected by asthma symptoms, with a mean total quality of life score of 4.7 (SD = 1.24) indicating a moderate impact. The physical aspect was most affected with a mean score of 4.0 (SD = 1.45), arising from for example, sleep disturbances due to wheezing in 75%, and wheezing during exercise (83.7%). These results are comparable to previous research in Australia, in which students' quality of life was also impaired because of asthma (Gibson et al., 1998). Therefore, the need for an intervention was apparent, so the researcher moved into the second phase of the pilot as described below.

2. Intervention phase

The three steps of Triple A are summarised in Figure 1 on page 37 in Chapter Three. Implementation of these steps of Triple A was conducted in November 2006, and lasted three weeks as outlined below. As described in Chapter Three, the resources were important components of the implementation process of Triple A. Figure 5 below represents the involvement of students in Triple A cascade during the intervention phase of the pilot study in Jordan.

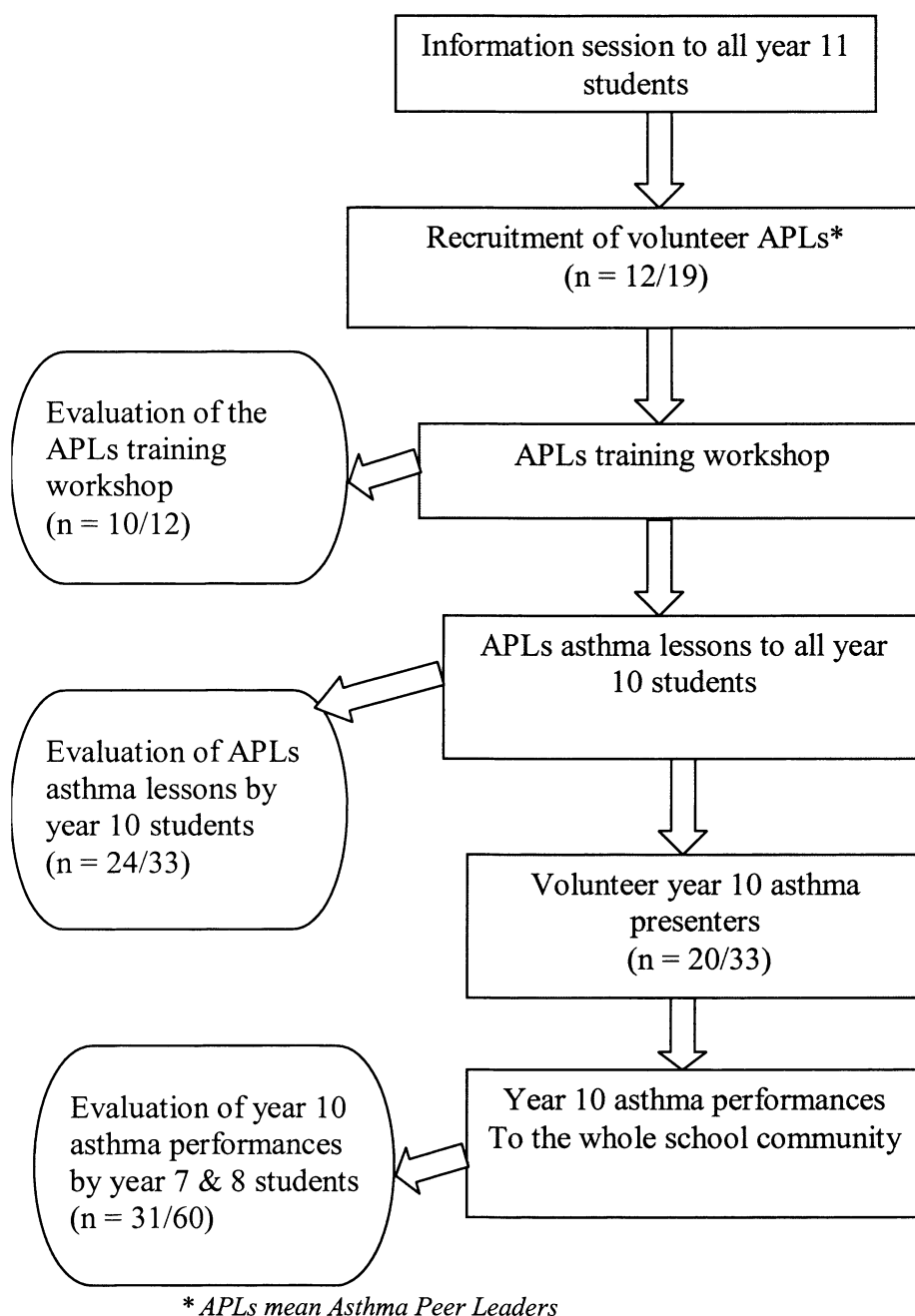


Figure 5 Flow chart of students' participation in Triple A cascade in the intervention phase

A) Training workshop for APLs. Before training began, recruitment of volunteers to be APLs (the basis of Triple A) occurred during a visit to the year 11 class by the researcher and the nominated school teacher. The role of APLs was

explained, participation was encouraged by the researcher, and then volunteers were requested with 12 students volunteering. APLs received their training during three workshop sessions of 90 minutes each in the school venue during school hours to fit in with their timetable. The training was conducted by the researcher and co-facilitated by a research assistant. A standardised training manual was used by the researcher as a guide during the APLs training workshop. The content included asthma information with several simple activities used to increase APLs' knowledge and awareness about asthma and related management. The empowerment session included learning and teaching activities, such as group discussions and problem-solving, to identify the issues faced by students with asthma, issues regarding communicating with doctors, and to help students to empower themselves to increase their self confidence to avoid cigarette smoking. Finally, the leadership session prepared APLs to conduct asthma lessons for year 10 students by practicing in front of their peers, and discussing some communication guidelines and tips to use in the asthma lessons. APLs were advised to follow the content of their APLs training manual, and they were reassured that they do not have to search for further information. This decreased the stress and the preparation time needed for the year 10 asthma lessons.

B) APLs lessons for year 10 students. Given the potential risks identified in Chapter one of using peer educators, the researcher and a school teacher attended the asthma lessons to ensure the correct information was provided about asthma and smoking by APLs, and to ensure no inappropriate behaviour occurred. The year 10 class had 36 students and the class was divided into two halves, which were taught by teams of six APLs. There were three asthma lessons of 45 minutes each conducted by the APLs who were actively engaged in both learning and teaching, and included activities and contents similar to the three sessions used for their own training that focus on utilising peer pressure in a positive manner. After the lessons, APLs asked for volunteers from the year 10 students to develop key asthma and smoking messages to present to the whole school community as creative performances.

Evaluation of the workshop for the APLs and by the APLs to the year 10 students were conducted using three open-ended questions to assess learning outcomes, and the aspects students enjoyed or would like to be improved (Appendix J, K) (Shah et al., 1998; Shah et al., 2001). These responses were analysed by the researcher and her supervisor, categorized and coded to allow comparison of students' responses in terms of the number of times a theme arose and relationships between themes. Results of the APL training workshop are combined with the year 10 students as the results of both evaluations were very similar. Ten APLs (83%) filled out the evaluation form after the training workshop and 24 year 10 students (73%) filled out the evaluation form after their workshop. Also, oral informal feedback was obtained from year 10 students.

Major themes were listed to draw out findings from the APLs and year 10 students' evaluation forms, which are summarised in Figures 9 to 12 in Appendix L. The most frequently reported learning outcome was improved asthma-related knowledge and awareness, including medications, symptoms, triggers (particularly passive smoking), and emergency management plan in school, which reflects successful feasibility and adaptability of the program. Secondly, APLs and year 10 students enjoyed the type of learning activities, especially the educational video, used in the training stating that these activities were straightforward and fun, and encouraged productive group work. Thirdly, all students liked the peer-led approach, reflecting successful acceptability of the program in Jordan. Moreover, APLs liked the teaching style of the researcher when facilitating their group, which is not surprising as she was a local bilingual trainer who understands the Jordanian culture. One additional point raised by the APLs was that some APLs chose to participate in the workshop because they wanted to learn and practice more English. This is an important motivation to consider for future work.

According to the oral feedback from year 10 students and the researcher's notes on the APLs specifically, the APLs were confident, organised and co-operative during the lessons, and they used the suggested scripts from the APLs training manual to introduce the activities to year 10 students. Also, APLs introduced some activities in English, which they then explained in Arabic using the same process that was used by

the researcher. Some year 10 students with asthma and wheezing felt supported and more confident during the lessons, so they shared their experiences with the rest of the class. These students were pleased because they said that their friends knew more about asthma and related management during the lessons, so they would be more supportive.

C) Year 10 asthma performances to the school community. APLs asked for 20 volunteers from the year 10 students (who had received lessons) to transform what they had learnt about asthma and smoking into asthma performances using songs, drama, poems and short acts to present to the rest of the school community. The main aims of the asthma skits were to promote asthma and smoking awareness in the school and to create a supportive school environment for asthma. Some of the educational objectives of the asthma skits were to increase students' knowledge of asthma and the related management, promote positive attitudes toward asthma, promote avoidance of cigarettes and passive smoking, and finally, to identify the steps needed in an asthma emergency in the school. Twenty students volunteered, making five groups of four students, who then presented short key asthma health messages to 131 students from year 7-10, APLs and schoolteachers during a special assembly. These asthma skits, which lasted approximately 5 minutes each, were presented during an assembly of 30 minutes in the school playground. These skits focused on resisting peer pressure to smoke and increasing knowledge, skills, and confidence in asthma management, including medications.

Evaluation and feedback on these skits were gauged in an oral feedback session directly after the assembly. Thirty one randomly selected year 7 and 8 students who had attended the assembly participated, with each student having the chance to talk briefly about her opinion of the performances. Notes were taken by the researcher during the round, which lasted approximately 20 minutes, these notes were then analysed and categorised by the researcher.

The year 7 and 8 students felt they had gained an awareness of asthma awareness, understanding that smoking is a bad habit and passive smoking worsens asthma, as well as positive attitudes and beliefs towards asthma. They enjoyed the skits

because they were creative and fun, and delivered by their friends and peers. The researcher noted that the year 10 volunteers were confident and seemed to enjoy giving the performances. No inaccurate information was presented and a few words were provided in English and Arabic including: asthma, wheezing, medications, coughing, inhalation, devices, and triggers. The performances themselves included important information and were presented in interesting ways using a poem, a drama, a poster or a song.

3. Evaluation phase

The final step of the process evaluation in Jordan was the evaluation phase, which included two focus groups, overall evaluation of the pilot study and resulting modifications that were made for the RCT. The two focus groups (

Figure 6) helped in further assessment of the acceptability and feasibility of Triple A in Jordan. Notes were made by the researcher and one research assistant during the focus groups, which were not audio-taped based on the preference of the participants. Each focus group took approximately 50 minutes and the related data were analysed to identify response themes.

Figure 6 below represents students' participation in the two focus groups during the evaluation phase.

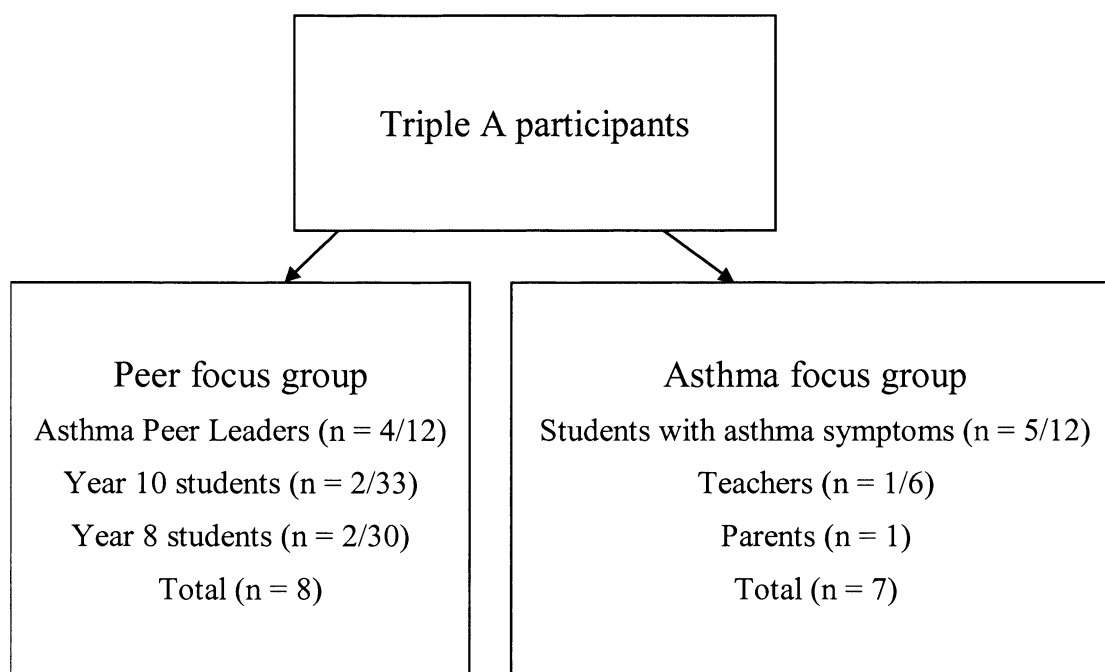


Figure 6 Participation by students involved in Triple A in two focus groups in Jordan

Overall evaluation of Triple A. A peer focus group was conducted to guide adaptation of Triple A and related resources for Jordanian adolescents if needed. All students who participated in the program cascade were eligible, however eight students were randomly selected using the closed envelope technique so that the group included APLS, year 10 and year 8 students (Figure 6). Key questions introduced by the researcher for the group to consider included: peer education, personal benefits of Triple A, likes and dislikes, and modifications needed for the program and its resources (Appendix M).

Three main themes emerged related to the students belief that 1) the peer-led approach could effectively increase asthma-related knowledge and awareness in schools and home, 2) the benefits of being involved in the process of peer-led education, which included being part of both learning and teaching, being able to teach their peers about asthma and smoking and being taught by their peers, and 3) the

personal benefits of implementing an English speaking program in the school, including the chance to speak and practice English with peers. In addition, students recommended specific modifications to make Triple A more useful and relevant to Jordan, and these included presenting some activities in both Arabic and English, adding information about the prevalence of asthma and smoking in Jordan, creating a glossary of English- Arabic translations of some words, and including some Jordanian photos for students during implementation of Triple A in the APL's training manual.

Knowledge, needs, and experiences of students with asthma in Jordan. The second focus group was designed to identify the knowledge, needs and experiences of adolescents with asthma in Jordan, the barriers to effective asthma management, and to determine the suitability of the questionnaires used. Five of the 12 eligible students were randomly selected again using the closed envelope technique. One parent of a student with asthma and one school teacher also attended the asthma focus group. Key topics that were addressed in this focus group (Appendix N) included asthma knowledge and awareness, the effect of the school and home on asthma management and experiences, and finally, the needs of students with asthma to achieve adequate self-management. Data resulting from the asthma focus group were analysed for recurring themes.

The most common themes that emerged were 1) Triple A made participants aware of the poor understanding and treatment of asthma at schools and home, 2) the strong influence of the school environment on students' experiences of asthma, including causing feelings of shame and embarrassment when they had asthma symptoms in schools, especially during exercise, 3) the positive effects of peer-led education in the school so that students with asthma symptoms felt more secure and supported, 4) school management of an asthma emergency, and 5) the negative effects of smoking on their health as they wanted this behaviour to be prevented in the school and community.

Therefore, it seemed clear that implementing Triple A in the school improved the students' knowledge and awareness of asthma, changed the experience of having

asthma symptoms in schools through creating a supportive school environment, and changed their attitudes regarding smoking in schools and community by creating a culture that inhibits smoking. As illustrated later in Figure 7 on page 70, Triple A has the potential to create a ripple effect within the school context, but this effect is difficult to determine as it was not specifically measured. However, school seems to be a good environment for the implementation of asthma education programs in Jordan as one third of its population are students and the other two thirds are families of those students (Ministry of Education, 2004b) increasing the potential for the ripple effect. Overall, the positive effects arose from Triple A in Jordan are consistent with the overall educational aims and objectives of Triple A as illustrated in Table 2 on page 73, and in (Figure 7) below.

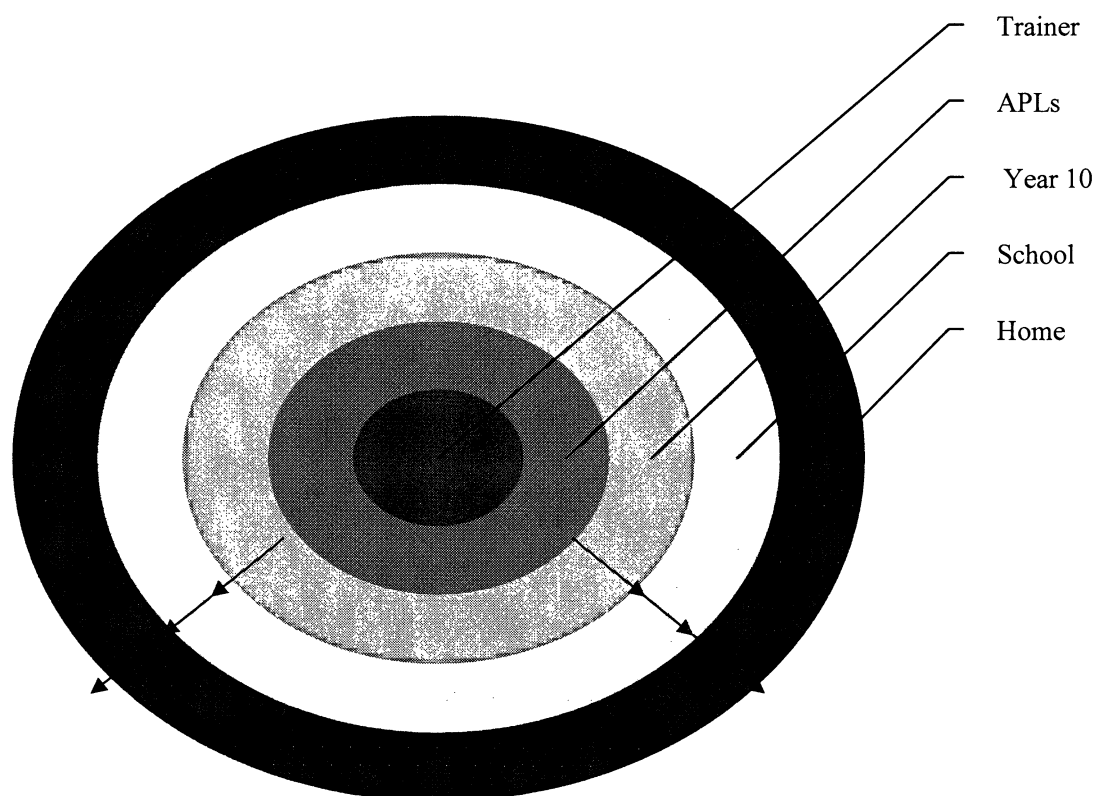


Figure 7 Theoretical ripple effect of Triple A

4.4 Summary of Findings

When these evaluations are combined with those from the peer leaders (APLs) and year 10 peer educators there is a very positive message about the use of peer education as exemplified by Triple A. The program was widely accepted by students in the school with full participation (100%) of all eligible students. Students readily volunteered to participate in Triple A with no refusals, which was important as one of the underlying theories of the program was the Green's health planning model. According to Green and her colleagues (Green et al., 1980), health education is dependent on voluntary assistance and involvement of participants, and the degree of change in knowledge and health practice that results is directly related to the degree of active participation of that person. Furthermore, students' feedback was positive, with no negative comments on any aspect of Triple A teaching and learning approach. Consistent with previous reports, APLs liked being involved in both learning and teaching other peers about asthma and smoking (Shah et al., 1998). Students with asthma also said that they needed an immediate action against smoking in the school and community.

Interestingly, APLs reported that they wanted to be involved in Triple A to have a chance to practice English in front of their peers. Moreover, APLs and year 10 students reported more confidence in their ability to speak in English as a second language. These results were not anticipated, but enhance the program's chance of success, and other similar English based health programs when adopted in Jordanian schools. Finally, all the resources used in the implementation process of Triple A in Jordan were in English, with use of bilingual explanation by the researcher to conduct certain activities, such as commenting on the video in Arabic language, and this was well-received by students.

Furthermore, peer leaders and year 10 students provided correct information and asthma messages to their peers. As mentioned earlier, training of peer leaders was critical for the successful implementation of the program (Story et al., 2002). For instance, no interruptions or corrections from the researchers were made during the APLs asthma lessons to year 10 students. Backett-Milburn and Wilson (2000)

highlighted the need to differentiate between adult concerns regarding the possibility that peer leaders might pass on incorrect factual information to their peers and the fear of using language that might not be approved by adults. Participating students felt more confident in treating asthma emergencies in schools and using asthma medications correctly after implementing the three steps of Triple A. This is not surprising because most of the activities included are based on Bandura's Social Cognitive Theory (Bandura, 1984, 1997) that considers vicarious experience and verbal persuasion as sources of improved self-efficacy.

Despite being developed in an English speaking country and in an Australian context, this peer-led education program proved feasible, acceptable, and adaptable in the Jordanian Arabic speaking context. Peers are influential and very powerful during adolescence, and peer pressure is universal, historical, and cross cultural, therefore, it is not surprising that the peer-led approach worked in Jordan despite the culture. The program was feasible because it was implemented with no difficulties and was able to be organised around the school timetable and curriculum objectives. The principal and key school teachers were supportive and volunteered to be involved in the implementation of the program, which relies on voluntary participation (Green et al., 1980).

Feasibility was improved by the researcher and the research assistants being respected local, bilingual staff members at a leading university in Northern Jordan. However bilingual workers were vital to success as researchers argue that linguistically and culturally competent health workers are needed for adapting successful health promotion programs (Bronheim, Sockalingam, & National Center for Cultural, 2003). The research assistants proved important to co facilitate the implementation of Triple A, which made it more efficient and productive. Furthermore, the finding that the majority of students (83.3%) had a high English proficiency level was also another good indicator that implementation and adaptation of Triple A and its resources in the English language could be feasible and understandable. This was evident during the training of APLs when more than one co facilitator was needed.

Table 2 Fulfilment of the Aims, Objectives, and Process Outcomes of Triple A Program According to Students' Evaluation as Adapted from Shah & Cantwell (2000)

Triple A program	APLs	Year 10 students	Year 7 & 8 students
Aims			
1. Create a supportive school environment for asthma	✓	✓	✓
2. Decrease asthma emergencies at school	NA*	NA	NA
3. Promote asthma awareness in the school community	✓	✓	✓
4. Prevent smoking	✓	✓	✓
Program objectives			
1. Use asthma reliever medications when required	NA	NA	NA
2. Take preventive action to avoid exercise-induced asthma	✓	✓	✓
3. Recognise signs of worsening asthma	✓	✓	✓
4. Understand the need to see a doctor for their asthma	✓	✓	✓
5. Comply with the daily use of preventer medications	NA	NA	NA
Educational objectives			
1. Increase knowledge of asthma and its management	✓	✓	✓
2. Promote positive attitudes towards asthma	✓	✓	✓
3. Promote avoidance of smoking and passive smoking	✓	✓	✓
4. Identify the steps to take in an asthma emergency	✓	✓	✓
Process outcomes			
1. Promotes social responsibility and leadership	✓	✓	NA
2. Enhances collaborative group work skills	✓	✓	NA
3. Offers opportunities to participate in community action	✓	✓	NA
4. Builds friendships	✓	✓	✓

*NA means not applicable due to the nature of teaching or to the process evaluation period

4.5 Implications

This study demonstrated that a peer-led health-related education program developed for students in Australia can be successfully adapted to a different context (Jordan). Based on the results drawn from the three phases of the pilot study, including

the two focus groups, and the researcher's reflective journal, it can be concluded that peer-led health promotion programs that aim at improving self-management of chronic diseases, as exemplified by Triple A, are needed, feasible in the Jordanian schools, well-accepted by Jordanian adolescents and school staff, and can be adapted to the Jordan context. The crucial role of local bilingual external trainers during the implementation of the three steps of the program was evident during the study. No cultural challenges were faced during the implementation process, which supports the fact that Triple A was based on well-established, universally applied psychosocial theories, such as the empowerment approach and Social Cognitive Theory, which could be suitable for adolescents regardless of their cultural backgrounds. Further research is needed to examine the effect of the program on specific outcomes. These include asthma related quality of life and knowledge, and self-efficacy to resist smoking, and among Jordanian adolescents. Therefore, Triple A could be successfully adapted for Jordanian adolescents with asthma symptoms in schools, with some minor modifications as outlined below.

Based on the results of the pilot study, the following modifications were determined for the main cluster-randomised controlled trial. Some activities need to be presented in both Arabic and English language to ensure student understanding of the information provided. The APLs workshop needs to be split into smaller sessions and the year 10 lesson timing changed to 60 minutes. Information about asthma in Jordan such as prevalence of asthma and smoking are needed for the APLs training manual. Students may provide signed consent for the study if the parents have given oral consent. Two words need to be changed on the CQWA to make it easier to understand in the Irbid region. Data on asthma severity, family income and school absences will not be used if students are not sure about the data. The modified version of the Triple A will be known as Triple A in Jordan or TAJ to reflect the changes.

Chapter Five - Cluster Randomised Trial of the TAJ Program

5.1 Introduction

This chapter describes the design of the main trial to test the effectiveness of a school-based, peer-led asthma education program, TAJ, on asthma-related quality of life, asthma-related knowledge, and self-efficacy to resist smoking in adolescents with asthma or recent wheezing in Jordan. This description includes the sample size, recruitment of schools and subjects, and allocation of subjects into groups. The procedure for tracking the subjects throughout the study and implementation of the intervention, which is the adapted program, is then described. Finally, the process of data collection, entry, and analyses of the study outcomes, are also detailed at the end of this chapter.

As mentioned in Chapter Two, the current study seeks to answer the following question “Does a school-based peer-led education program aimed at adolescents with asthma improve asthma-related quality of life, knowledge of self-management of asthma, and self-efficacy to resist smoking, compared to usual asthma care in high school students in Jordan?”

5.2 Design

A cluster-randomised (at the school level), controlled design was selected for this study, chiefly because this design is the gold standard in public health and medicine when allocation of groups is necessary (Murray, Varnell, & Blitstein, 2004). In addition, randomisation by cluster is necessary to evaluate interventions, which occur at the group level, influence the physical or social environment, or cannot be delivered to individuals (Murray, 1998). In this case, it is unreasonable to allocate by individuals because it is a whole school-based intervention, and depends on the existence of social peer groups and a school culture. Furthermore, randomisation by cluster was found to be acceptable in previous similar studies (Shah et al., 2001).

While a cluster-randomised, controlled trial is the best design to answer the research question mentioned earlier in this chapter, there are some concerns associated with randomisation by cluster (Scheier, Griffin, Doyle, & Botvin, 2002). One of these concerns relates to the school being the unit of assignment when the student is the unit of observation. This can result in loss of ability to conduct statistical comparisons that assume independent observations, so that only large effects will be noted. In addition, students within schools are likely to cluster together in regards to the outcomes of interest, so that there is higher similarity or homogeneity of behaviours within a school compared to those between schools (Scheier et al., 2002). For these reasons, the cluster effects were accounted for in the sample size calculation and during the analysis, as described later in this chapter.

5.3 Instruments and Selection of the Main Study Variables

The same questionnaires described in Chapter four, including the CQWA, were used for the main study (Appendix D) These questionnaires were: the Paediatric Asthma Quality of Life Questionnaire (PAQLQ) to assess asthma-related quality of life and related domains, Asthma Knowledge Consumer Questionnaire (CQ) to assess asthma-related knowledge, and Self-Administered Nicotine Dependence Self-efficacy Sub Scale (SANDSES) to assess self-capacity to resist smoking among students. In addition, the Core Questionnaire for Wheezing and Asthma (CQWA) was used at baseline only for identification of students with recent wheezing among students. A validated Arabic version of each of the above mentioned questionnaires was used in this study. The internal consistency of these instruments was measured through Cronbach's alpha, as illustrated in Table 3 below. The value of Cronbach's alpha for both the PAQLQ and the SANDSES were high indicating good internal consistency and overall reliability. For the CQWA, Cronbach's alpha indicated fair reliability of the instrument, with similar value in previous reports (Shaw et al., 1992). However, Cronbach's alpha for the CQ was low in this study, but was higher (0.78) in the development/validation study of the CQ (Kritikos et al., 2005). However Kritikos and her colleagues had to remove two items as their removal improved the overall reliability of the CQ. This is a weakness in the study and is acknowledged in Chapter Seven.

Table 3 Cronbach's Alpha of Questionnaires Used in the Study

Questionnaire	Cronbach's Alpha
PAQLQ	0.97
SANDES	0.81
CQ	0.44
CQWA	0.60

5.4 Subjects and Setting

Four schools were randomly selected from the list of all eligible schools in the Irbid region stratified by gender, by a research assistant using the closed envelope technique. Stratified randomisation by gender was used to reduce the likelihood of gender imbalances between the subgroups because effects of gender on the main study variable were possible (EMEA, 2003). Schools were eligible for the list if they were unisex, public, included year 8 through year 11, had similar baseline socioeconomic and educational characteristics, consented to participate in the study for the whole study period, were not involved in any other concurrent health-related study, and finally, were located in close geographical proximity. Therefore, two schools were randomly selected by a research assistant from all the eligible high schools for girls (31), and the other two schools were randomly selected from all the eligible high schools for boys (23), with an average number of students in year 8, 9, &10 in these schools of 388 (

Figure 8).

Within the school, students were considered eligible for participation in the study if they were in year 8, 9, or 10, had recent wheezing in the last 12 months as detected by the CQWA, physically and cognitively capable of completing the survey, able to read and converse in both Arabic and English, attending regular school classes, free of any other major diseases that could affect quality of life measures, and finally, not involved in another concurrent health-related study.

Sample size. Determination of the sample size needed for clinical trials requires an estimate of the anticipated outcome measure difference between the comparison groups and the acceptable alpha and beta error rates (Juniper et al., 1996). The primary outcome in this study is quality of life, and the anticipated minimal clinically important difference in quality of life is 0.5, with a pooled standard deviation of 0.71. This difference is based on the Paediatric Asthma Quality of Life Questionnaire (PAQLQ) (Juniper et al., 1996, p. 47), which was used in the study to assess quality of life in the sample. The minimal important difference can be defined as “the smallest difference in score in the quality of life domain of interest, which patients perceive as beneficial, and which would mandate a change in the patients' management” (Jaeschke, Singer, & Guyatt, 1989).

At Alpha equals 0.05 and beta equals 0.1 (two-sided), Juniper et al. (1996) reported that 61 patients per group are needed to detect a difference in quality of life. Based on Juniper's work, an average of 122 students would be required in this study to detect a clinically important change in quality of life score. However, the effect of randomisation by cluster in the design must be taken into account (Hedges, 2007). In any cluster randomised trial, the Intraclass Correlation Coefficient (ICC) and the number of groups per condition are the two factors that determine adequate power and calculate the sample size needed (Hedges & Hedberg, 2007; Murray, 1998). One strategy for obtaining the value of the ICC, is to obtain these values from previously conducted cluster-randomised trials (Hedges & Hedberg, 2007), although it is difficult to find appropriate estimates of ICC to use in the planning stages of studies (Varnell, Murray, Janega, & Blitstein, 2004). However, similar previous work reported that a sample size of 251 students was needed to create a clinically meaningful as well as statistically significant improvement in quality of life score (> 0.5 units) in the intervention group (Shah et al., 2001). The ICC values for the mean difference in quality of life scores in Shah's study were less than 0.002 for all quality of life domains (Shah et al., 2001). In this study, the design effect (DF) or the Variance Inflation Factor (VIF) of the study was 1.26, which means there was very little effect of the cluster design on the sample size needed. Based on this, the sample size required for this study was determined to range from 250 to 280 students, with power of 80% and 0.05 alpha (Lenth, 2006).

5.5 Procedure

The methods used in this study were similar to those used in the pilot study in Chapter Four in regards to school permission, workshop for teachers, research assistant roles, and eligibility of students. Similar to the pilot, following preliminary telephone calls to the schools' principals, all four principals granted permission for their students to participate in the study, if they and their parents agreed. Similar to the process of gaining support from teachers in the pilot, in the intervention schools, a meeting with some of the volunteer teachers was conducted by the researcher to explain the Triple A program and related resources in great detail. This preparation of the schools' staff was strongly recommended by the developer of the Triple A program (Shah et al., 1998). Finally, an Asthma First Aid Kit was provided for both schools in the Triple A group. The two research assistants were the same research assistants who were involved during the pilot study in Chapter Four, so no further training was required.

Eligible students were identified during the screening stage for recent wheezing (in the last 12 months) at the four schools. Following the same procedure described for the pilot study in Chapter Four, all year 8, 9 and 10 students, who attended the screening stage in all schools were asked to complete the CQWA. The CQWA was used to identify students with recent wheezing, who were approached to join the study, and consent sought. This process resulted a combined total of 261 students of 1522 (17%) in years 8, 9, and 10, who reported recent wheezing in the last 12 months. Allowing for an estimated dropout rate of 5%, 244 eligible students completed the trial, ensuring an adequate sample throughout, as detailed in the CONSORT in

Figure 8.

All eligible students who were approached agreed to participate (100% participation rate) after their parents told them they could join the study. Informed consent was obtained by providing each eligible student with an information sheet (Appendix E), and allowing the students time to talk to their parents to obtain their agreement. All students, who agreed to participate and their parents told them they

could participate, then signed a consent form (Appendix F). Students were reassured that they were free to withdraw from the study at any time, and that this withdrawal would not affect their school status in any way. The name and telephone number of the researcher and research assistants were given to the students so that they could withdraw or obtain information about the study at any time. Approval for the study was obtained from the Human Research Ethics Committees at the Ministry of Education in Jordan (Appendix A), both first and second Irbid districts, and the University of Technology, Sydney in Australia (Appendix B).

Seventeen students from both groups did not complete the trial because they were absent from school on the day of outcome data collection (6 from the intervention group, 11 from the control group). No attempt was made by the researcher to collect the data on another school day. Recruitment of school, students, allocation to groups, and flow of students throughout the study are represented in the CONSORT statement in

Figure 8, as adapted from Campbell and colleagues (Campbell, Elbourne, & Altman, 2004).

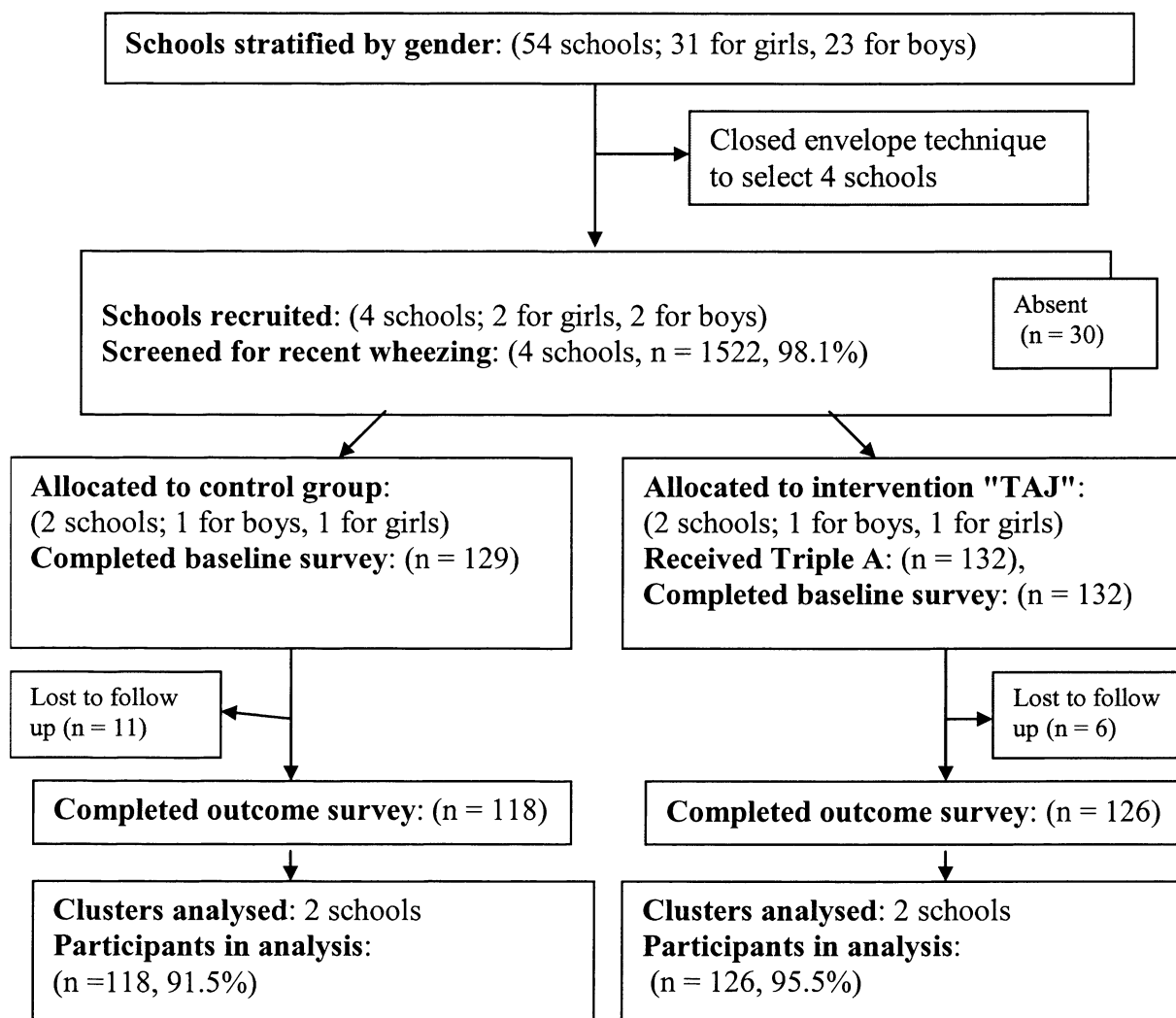


Figure 8 Recruitment of schools, flow of students through trial recruitment, randomisation to groups, intervention (TAJ), completions and lost to follow up

Consenting students were then asked to complete the baseline main survey containing the three Arabic versions of the questionnaires (PAQLQ, CQ, and SANDSES). The timing of this data collection was selected with the help of the schools' principals to ensure that students did not miss important classes, and that the process did not interfere with students' exam schedule or curriculum. Baseline data collection took about 20 to 25 minutes to complete.

Allocation of schools into intervention and control groups. Allocation to groups occurred by the cluster (school) randomised method (Hauck, Gillis, Donner, & Gortner, 1991). The researcher, in the presence of a research assistant, used the closed envelope technique to determine which study group schools would be allocated to. One of the two schools for boys and one for girls were randomly selected using the closed envelope technique. This allowed the researcher to include one boy's school and one girl's school in each study group to ensure equal representation of gender in both groups (EMEA, 2003). Although the schools were close geographically, there was little overlap in students, which prevented contamination between the control and the TAJ groups. Also, none of the students reported any type of communication with students in the other group (Hauck et al., 1991). Allocation of schools into groups resulted in 129 students with recent wheezing in the control group, and 132 in the Triple A group.

After baseline data collection, implementation of the TAJ program was conducted for schools in the intervention group in December 2006 over three weeks. The implementation process was similar to that in the pilot study (Chapter Four), and is described briefly later in this chapter. Three months after implementing the TAJ program, outcome data were collected in April 2007 from the students by a research assistant with the help of volunteer teachers assigned in each school for this purpose. Outcome data collection, using the same survey as baseline, took 20 to 25 minutes to complete. This timing was selected similar to previous reports testing Triple A, and suggest that at least three months should elapse after the intervention before collecting outcome data to ensure clinically meaningful effects (if any) in quality of life and related domains (Shah et al., 2001).

Implementation of TAJ. As explained in Chapter Four, the researcher had extensive training from the developer of the program to become a Triple A educator. The researcher and the research assistants were bilingual and bicultural health care providers, who were well aware of the beliefs and practices of Jordanian adolescents with asthma and their families. The program was implemented to improve asthma self-management by increasing asthma-related knowledge and self-efficacy to resist

smoking and thereby quality of life. Detailed explanation of implementation of the three steps of the Triple A program is provided in the pilot study in Chapter Four, with some minor amendments (see specific modifications of the RCT resulting from the results of the pilot study in Chapter Four). A brief summary of implementation of the Triple A program is provided next.

Both schools in the TAJ group received a structured and standardised intervention provided by the Triple A training manuals, which describe each activity and suggest some scripts and timeline for presenting these activities. The researcher and the research assistants followed the instructions in the Triple A educators' manual during the delivery of the Asthma Peer Leaders (APLs) workshop. Well-trained APLs were encouraged to use the APLs training manual as a guide during delivery of asthma lessons to year 10 students. The researcher and a school teacher were present during asthma lessons to ensure that APLs were delivering correct information to year 10 students and behaving appropriately.

In the high school for boys, twelve volunteer students in year 11 participated in the APL's training workshop, which was conducted by the researcher and co-facilitated by a research assistant. The school principal voluntarily attended and enjoyed several parts of the activities included. This workshop lasted six hours. One week later, four teams of three asthma peer leaders conducted two 60-minute asthma lessons for each of the four year 10 classes in the school. In the beginning of January 2007, four groups of year 10 students volunteered to develop and present key messages learnt in the two asthma lessons to year 8 and year 9 students. Key asthma messages were presented during a special assembly that was organised by the school principal and a volunteer teacher in the school. In both schools, the implementation of TAJ program was similar, with similar ethical considerations to the pilot.

At the end of the study, a total of 132 students with recent wheezing in the TAJ group received the intervention. Each class received the TAJ program as planned (55 in year 8, 43 in year 9, 34 in year 10). Other classmates without recent wheezing in any of the above classes, who were present on the day of implementation, also received the

intervention. Of the 132 students, six were absent on the day of outcome data collection (

Figure 8).

5.6 Data Management and Analysis

Data management. All data collected from the students were coded and kept separate from the consent form that contained the student's identification details. All survey questionnaires, consent forms, and computer discs were stored in the researcher's office in a locked cabinet in a locked office. Information identifying individual students was stored in a separate secure file and was shared between the researcher and research assistant for outcome data collection only.

During the process of data collection, data were checked and entered regularly by the researcher into two computer databases (SAS version 8 for the main results and SPSS version 14 for all other analyses). The researcher and her supervisor checked data entry by 10% random double entry for both the baseline and the outcome data. An error rate of 1% of data entry was found for the total data, which is considered highly acceptable for this type of study (Horbar & Leahy, 1995).

Data analysis. Descriptive statistics, including means, frequencies, and percentages, were used to describe the sample characteristics. Chi-squared test was used to compare the two groups for categorical data such as gender, class level, English proficiency level, and perceived allergens and related clinical conditions. Mann-Whitney U test was used to compare the groups for ordinal study variables such as the number of wheezing episodes in the last 12 months and number of sleep disturbances in the last 12 months. Paired sample t tests were carried out to assess the difference within each group for each of the main study variables over time (between baseline and outcome).

Preliminary analyses (ANOVA) were performed by the SAS.PROC.MIXED base model to assess the effect of the intervention on the major outcome variables using the REML method. SAS was used because of the complexity of the analysis by cluster. Analyses by SAS.PROC.MIXED model were performed to assess the effect of the intervention (TAJ) on quality of life, asthma-related knowledge, and self-efficacy to resist smoking in this study, as this model accounts for allocation to groups occurring by clusters (schools) not individuals (Murray, 1998). The SAS.PROC.MIXED model was used to obtain variance estimates for the appropriate random (school) and residual components, and these variance estimates are then used to compute the ICCs. An advantage of the SAS.PROC.MIXED procedure is that it uses a restricted maximum likelihood estimation (REML) method to derive variance components. The REML method produces more competent fixed-effect estimates with the unbalanced data, and permits estimation of multiple components of variance, unlike the Ordinary Least Squares (OLS) estimation, which allows estimation of only a single component of variance (Scheier et al., 2002).

However, to account for these baseline differences or imbalances between the groups, the SAS.PROC.MIXED adjusted model was adjusted for the three expected baseline covariates using ANCOVA. These were gender, English proficiency level, and number of recent wheezing episodes (Goldney, Ruffin, Fisher, & Wilson, 2003; Okelo et al., 2004; Shah et al., 2001; Siersted et al., 1998). As mentioned in Chapter Three, these covariates either influence the degree of understanding asthma information or the degree of asthma severity, therefore directly affect asthma self-management. In addition, these covariates have been shown to have moderate or strong association with quality of life, the main study variable. EMEA (2003) advises researchers to identify the covariates expected to have an important influence on the primary outcome, and to identify how to account for them in the analysis. This is particularly important to improve accuracy and compensate for any lack of balance between study groups. Other baseline measures were not adjusted for in the analysis even if they showed baseline imbalances between groups because of no existing strong association between them and the primary outcome measure (EMEA, 2003).

As the study used a randomised, controlled design by cluster, Intraclass Correlation Coefficient (ICC) was measured to examine the homogeneity of students within clusters, and therefore, the degree of cluster design effect on the study outcomes. The ICC is a measure of the effect of clustering in the data, which reflects the homogeneity of elements within clusters (Hedges, 2007). The ICC has a maximum value of +1 when there is a complete homogeneity within clusters, therefore a complete clustering effect. It also has a minimum value of $(-1/(n - 1))$ when n is the number of subjects in each cluster, when there is an extreme heterogeneity within clusters, therefore no clustering effect in the data. However, it has been confirmed that the adverse impact of a positive ICC can be reduced by regression adjustment for covariates (Murray, 1998; Murray et al., 2004), which was performed during analyses of the current study. All the study results derived from the analyses are presented in Chapter Six, which follows.

Chapter Six - Results of the Cluster Randomised Controlled Trial

6.1 Introduction

This chapter begins by describing the overall characteristics of the study sample, who were students with recent wheezing in years 8, 9, and 10. Any difference in the control and the intervention (TAJ) groups is reported at baseline. Sample characteristics in regards to the three main outcome study variables were described for the study population as well as for each study group. The results of the randomised controlled trial and the TAJ program are provided for quality of life with its three sub domains, asthma-related knowledge, and self-efficacy to resist smoking. Finally, changes between baseline and follow-up for both groups on the major outcome variables are also described.

6.2 Sample Characteristics at Baseline

As reported earlier in Chapter Five, the main eligibility criterion for participation in this study was that students reported wheezing in the last 12 months. The total number of eligible students, who met this criterion was 261 from a total population of 1522, therefore, the prevalence of recent wheezing was 17.15% in this study.

Overall, the sample had fewer females (43.3%) than males, which is typical of Jordanian schools (Table 4). Most students were from year 8 (43.3%), and most (85.4%) of the students had at least moderate English proficiency. The groups differed at study entry, so that the intervention group had less females ($p < 0.03$) and more students with high English proficiency (45.5%) than those in the control group (Table 4). As stated previously, both gender and English proficiency level were included as covariates in the analysis.

Table 4 Demographic Characteristics of the Sample (Students with Wheezing in the last 12 months)

	Intervention	Control	Overall*	
Characteristics	(n = 132)	(n = 129)	(n = 261)	P level**
	N (%)	N (%)	N (%)	
Female	48 (36.4)	65 (50.4)	113 (43.3)	0.03
Class level				
Year 8	55 (41.7)	58 (45.0)	113 (43.3)	
Year 9	43 (32.6)	39 (30.2)	82 (31.4)	0.86
Year 10	34 (25.8)	32 (24.8)	66 (25.3)	
English proficiency				
Low (≤ 50)	15 (11.4)	22 (17.1)	37 (14.5)	
Moderate (50-75)	56 (42.4)	66 (51.2)	122 (47.8)	0.02
High (> 75)	60 (45.5)	36 (28.0)	96 (37.6)	

* numbers may not add up to 261 because of missing data, ** chi-squared analysis

Self reported cigarette smoking of students and their families. Overall, smoking was very common, with almost one third (27.7%) of students reporting that they were smokers (Table 5). Also, approximately two thirds (70%) of the sample had at least one smoker in the family, oftentimes (57%) at least one member of the family was a heavy smoker. The most common family member who smoked was the father (55%). The groups did not differ with respect to cigarette smoking status. This is an interesting finding given that the control group has 14% more females than the

intervention group and that girls do not tend to smoke or at least do not report being smokers in the Jordanian culture.

Table 5 Self Reported Cigarette Smoking Status of Students and their Families

	Intervention	Control	Overall	
Cigarette smoking status	(n = 132)	(n = 129)	(n = 261)	P level**
	N (%)	N (%)	N (%)	
Student smoker	33 (25.1)	39 (30.3)	72 (27.7)	0.59
Family smoker *				
All Smokers	95 (72.0)	92 (71.3)	187 (71.3)	
Mother	2 (1.5)	7 (54.3)	9 (3.5)	0.69
Father	78 (60.0)	64 (50.0)	142 (55)	
Sibling	12 (9.0)	19 (14.7)	31 (12)	
Frequency of family smoking				
Regularly	34 (25.8)	25 (19.4)	59 (28.5)	
Heavily	54 (40.9)	64 (49.6)	118 (57)	0.29
Rarely	24 (18.1)	6 (4.6)	30 (14.5)	

* may choose more than one category, ** Chi squared analysis

Asthma status and related medications. As reported earlier, all students in this study had experienced wheezing in the last 12 months at baseline, which was the main eligibility criterion of participation. Overall, more than two thirds (70.5%) of the students reported that they had a professional asthma diagnosis, meaning that approximately one third of the sample did not have an asthma diagnosis, despite the presence of asthma symptoms (Table 6). For those diagnosed, only one third (33.3%) of the sample reported that they use inhaled salbutamol with even less use (21.8%) of corticosteroids. Beside salbutamol, students also reported use of Asmadil, which is an oral reliever medication and it is common in Jordan. Overall, this suggests that asthma may be underdiagnosed and inadequately treated in adolescence.

Asthma affected students' lives markedly as more than two thirds (75.1%) of students experienced sleep disturbances in the last 12 months because of asthma symptoms, with almost a quarter (26.5%) waking up at least once a week during the night. Moreover, the majority of the students reported that they experienced wheezing during exercise (66.3%) and dry cough at night (72.4%). Also, approximately a quarter (24.5%) of students experienced symptoms severe enough to cause speech limitation.

Chi- squared analysis was used in this section to compare both groups for all the variables except for the number of wheezing attacks and the number of sleep disturbances in the last 12 months, where Mann-Whitney U test was used. Groups were equivalent in terms of diagnosis of asthma at baseline, and experiencing dry cough at night. However, more students in the control group reported wheezing during exercise ($p < 0.00$), sleep disturbances of at least once a week ($p < 0.00$) and accordingly, more use of asthma relievers ($p < 0.01$). Noticeably, the number of students who reported speech limitation because of asthma symptoms was almost double (41) in the control group than those in the Triple A group (23). This indicates that the students in the control group had more asthma symptoms at baseline, which could affect the outcome of the study. The number of wheezing attacks was therefore a covariate in the analysis.

Table 6 Self Reported Asthma Symptoms and Related Medications in the Last 12 Months

	Intervention	Control	Overall*	
Asthma /Wheezing Status	(n = 132)	(n = 129)	(n = 261)	P**
	N (%)	N (%)	N (%)	
Asthma diagnosis	96 (72.7)	88 (68.2)	184 (70.5)	0.37
Asthma medication use				
Salbutamol (inhaled)	31 (23.5)	56 (43.4)	87 (33.3)	0.00
Corticosteroids	27 (20.5)	30 (23.3)	57 (21.8)	0.59
Asmadil (oral)	21 (15.9)	34 (26.4)	55 (21.1)	0.04
Wheezing attacks in <=12months				
None	1 (0.76)	4 (3.1)	5 (2.0)	
1-3	107 (81.1)	86 (66.7)	193 (77.2)	0.06
4-12	14 (10.6)	21 (16.3)	35 (14.0)	
> 12	5 (3.8)	12 (9.3)	17 (6.8)	
Number of sleep disturbances				
Never woken up	44 (33.3)	19 (14.7)	63 (24.9)	
< 1 night/wk	58 (43.9)	65 (50.4)	123 (48.6)	0.00
≥ 1 night/wk	27 (20.5)	40 (31.0)	67 (26.5)	
Speech limitation	23 (17.4)	41 (31.8)	64(24.5%)	0.00
Wheezing with exercise	70 (53.0)	103 (79.8)	173 (66.3)	0.00
Dry cough at night	100 (75.8)	89 (69.0)	189 (72.4)	0.22

* numbers may not add up to 261 because of missing data, ** Mann-Whitney U and Chi squared analysis as appropriate

Asthma related allergen perceptions and clinical conditions. Not surprisingly, given the high prevalence of cigarette smoking among students and their families, the most commonly reported allergen by the students was cigarette smoking (38.3%), followed by dust (26.1%) as detailed in Table 7. Overall, recurrent chest infections were very common, occurring in one third of the sample. Rhinitis was reported by approximately 22.2% of the sample, whereas eczema was reported by fewer students (17.2%). Using Chi-squared analysis, more students (49.6%) in the control group reported cigarette smoking as an allergen than in the intervention group ($p < 0.00$). Both groups were different in regards to all other allergens at baseline except for dust, which was equal for both groups ($p < 0.13$). Noticeably, twice as many students in the control group (1 in 2) reported that they had recurrent chest infections compared to those in the intervention group (1 in 5) ($p < 0.00$) (Table 7).

Table 7 Self Reported Allergens and Asthma Related Conditions

	Intervention	Control	Overall	
Perceived Allergens and conditions	(n = 132)	(n = 129)	(n = 261)	P **
	N (%)	N (%)	N (%)	
Allergen *				
Cigarette smoke	36 (27.3)	64 (49.6)	100 (38.3)	0.00
Dust	29 (22.0)	39 (30.2)	68 (26.1)	0.13
Perfume	21 (15.9)	33 (25.6)	54 (20.7)	0.05
Environment	22 (16.7)	16 (12.4)	38 (14.6)	0.00
Other sources	12 (9.1)	29 (22.5)	41 (15.7)	0.00
Asthma related conditions				
Eczema	25 (18.9)	20 (15.5)	45 (17.2)	0.46
Rhinitis	37 (28.0)	21 (16.3)	58 (22.2)	0.02
Recurrent chest infection	24 (18.2)	56 (43.4)	80 (30.7)	0.00
Other Chronic illnesses	16 (12.1)	1 (0.78)	17 (6.5)	0.00

* students can select more than one, ** chi squared analysis

Quality of life, Asthma knowledge, Self-efficacy to resist smoking.

Overall, students had moderate quality of life at baseline (overall mean score = 4.44, SE = 0.12) and there was no difference between the two groups for total quality of life score ($p < 0.08$) (Table 8). Although not statistically significant, this score could be clinically indicating that some students in the control group had more impairment in quality of life due to asthma. Similarly, the students had moderate quality of life impairment in each of the three quality of life domains at baseline. Both groups were equivalent at baseline in all of the activity ($p < 0.057$), symptom ($p < 0.14$), and emotional ($p < 0.10$) domains, although the activity domain in the control group (4.14, SE = 0.13) was lower, and close to being statistically significant (Table 8).

Overall asthma-related knowledge was poor, with the mean score was 6.06 (SE = 0.18), meaning that students answered only half of the questions correctly at baseline. Groups were equivalent on asthma-related knowledge scores at baseline ($p < 0.25$). Also, the students had a low level of self-efficacy to resist smoking (mean = 7, SE = 0.52), as the mean score was in the bottom half on the scale. The groups were also equivalent at baseline for self-efficacy to resist smoking ($p < 0.18$).

Unconditional Intraclass Correlation Coefficient (ICC) values were calculated for all the study variables at baseline (before using the adjusted model). As explained in Chapter Five, ICC values in this study are indicators of the degree of homogeneity of students with in schools in regards to the study variables. The (unadjusted) ICC value was the lowest for asthma-related knowledge (ICC = - 0.147), and the highest in the emotional domain of quality of life (ICC = 0.305). The negative low value of ICC for asthma-related knowledge indicates that the between-school variation was significantly less than within-school variation, and has introduced non random effects on the different schools. This good indicator of extreme heterogeneity within schools suggests that there was no effect of clustering in asthma-related knowledge scores.

However, the ICC value for the total quality of life, which is the main study variable, was 0.299 suggesting some degree of variation between the schools, and some homogeneity of students within schools, although not large enough for the cluster design to affect the results. Therefore, as described in the analysis section in Chapter Five, the cluster design was accounted for in the analysis by using the SAS.PROC.MIXED Base model. In addition, the analysis was adjusted for three baseline covariates that showed baseline imbalances between the groups. These covariates increased the statistical power by explaining between- and within-school variance (Hedges & Hedberg, 2007). For example, the (adjusted) ICC values for all the study variables were decreased after using the SAS.PROC.MIXED Adjusted model. Full description of the analysis protocol and justification for choosing the SAS.PROC.MIXED model, with the REML method, was detailed in full in Chapter Five in the data analysis section.

Table 8 Comparison Between Groups for Quality of Life Asthma Knowledge, and Self-Efficacy to Resist Smoking at Baseline (N = 244)

Study variable	Intervention			Control			Mean diff. (P level)**
	95% CI			95% CI			
	M (SE)	Lower	Upper	M (SE)	Lower	Upper	
PAQLQ*	4.72 (0.11)	4.23	5.22	4.16 (0.12)	3.65	4.67	0.56 (0.08)
Activity	4.87 (0.13)	4.32	5.41	4.14 (0.13)	3.57	4.70	0.73 (0.06)
Symptom	4.42 (0.12)	3.90	4.93	4.00 (0.12)	3.47	4.53	0.42 (0.14)
Emotion	4.88 (0.12)	4.35	5.42	4.35 (0.13)	3.80	4.90	0.53 (0.10)
CQ	5.86 (0.18)	5.10	6.61	6.26 (0.18)	5.50	7.05	0.40 (0.25)
SANDSES	6.26 (0.54)	3.92	8.60	7.74 (0.51)	5.56	9.92	1.48 (0.18)

*PAQLQ indicates quality of life, CQ indicates asthma knowledge, SANDSES indicates self-efficacy to resist smoking, ** Mean difference between groups

6.3 Effect of TAJ on Quality of Life

As illustrated in Table 9 below, students had statistically and clinically significant better quality of life after the intervention (TAJ). The students in the intervention group had 1.35 points better quality of life compared to the control group. As identified in Chapter Five, a change of 0.5 in the mean quality of life score is considered clinically significant. Students in the intervention group had a clinically meaningful increase in quality of life score from baseline to outcome (change in score = 0.7, $p < 0.04$), whereas a decrease in score was noticed in the control group (change in score = - 0.09, $p < 0.58$) (Table 10).

Students in the intervention group also had significantly improved scores in all of the three domains, whereas no improvement occurred in the control group. The mean difference between groups was 1.19 (95% CI = 0.87 – 1.65, $p < 0.03$) in the activity, 1.38 (95% CI = 1.12 – 1.87, $p < 0.02$) in the symptom, and 1.34 (95% CI = 1.07 – 1.82, $p < 0.02$) in the emotional domains, all clinically meaningful differences. Also, from baseline, symptoms and emotional domains had clinically meaningful increases in the intervention group at outcome (Table 9). On the contrary, the students in the control group remained at same moderate quality of life impairment in all of the domains at outcome. Importantly, as reported in Table 10, the Triple A group had most improved in the symptom domain scores (change in score = 0.97), followed by the emotional domains (change in score = 0.71), and the activity domain (change in score = 0.4).

Table 9 Comparison Between Groups for Total Quality of Life and Related Domains at Outcome (N = 244)

Study variable	Intervention			Control			Mean difference between groups (95% CI)	Group difference P level
	M (SE)	95% CI		M (SE)	95% CI			
		Lower	Upper		Lower	Upper		
PAQLQ*	5.42 (0.12)	4.91	5.92	4.07 (0.12)	3.54	4.60	1.35 (1.04 – 1.76)	0.02
Activity	5.27 (0.13)	4.71	5.83	4.08 (0.14)	3.50	4.70	1.19 (0.87 – 1.65)	0.03
Symptom	5.39 (0.12)	4.86	5.91	4.01 (0.13)	3.46	4.56	1.38 (1.12 – 1.87)	0.02
Emotion	5.59 (0.13)	5.04	6.14	4.25 (0.13)	3.67	4.82	1.34 (1.07 – 1.82)	0.02

* PAQLQ indicates quality of life

Table 10 Change in Score in Total Quality of Life and Related Domains from Baseline to Outcome in Both Groups (n = 244)

Study variable	Intervention*		Control	
	Change in score from baseline	Within group difference p	Change in score from baseline	Within group difference p
PAQLQ**	0.7	0.04	-0.09	0.58
Activity	0.4	0.14	-0.06	0.79
Symptom	0.97	0.02	0.01	0.98
Emotion	0.71	0.04	-0.1	0.59

*SAS.PROC.MIXED adjusted (for 3 covariates) model was used, **PAQLQ indicates quality of life

6.4 Effect of Triple A on Asthma Knowledge and Self-Efficacy to Resist Smoking

As illustrated in Table 11, after implementing the TAJ program, students answered a mean of 1.62 more knowledge-related questions correctly, a significant improvement of 1.28 points, ($p < 0.04$), whereas the control group had decreased knowledge of - 0.74 points (Table 12).

Table 11 Comparison Between Groups for Asthma Knowledge and Self-Efficacy to Resist Smoking at Outcome (n = 244)

Study variable*	Intervention			Control			Mean difference (95% CI)	Group difference p
	95% CI			95% CI				
	M (SE)	Lower	Upper	M (SE)	Lower	Upper		
CQ**	7.14 (0.18)	6.36	7.92	5.52 (0.19)	4.70	6.34	1.62 (1.15 - 2.19)	0.03
SANDES	11.53 (0.54)	9.20	13.87	6.90 (0.56)	4.50	9.30	4.63 (2.93 – 6.35)	0.03

*df = 241 for asthma knowledge, df = 48 for self-efficacy to resist smoking, SAS.PROC.MIXED adjusted (for 3 covariates) model was used, CQ indicates asthma knowledge, SANDES indicates self-efficacy to resist smoking

Furthermore, as illustrated in Table 11 above, students in the intervention group had improved seven more points in the questions related to self-efficacy to resist smoking after the TAJ program (95% CI = 9.20-13.87, total score ranges from 0 to 16) compared to no improvement at all in the control group. Also, as reported in Table 12 below, a clinically meaningful improvement in self-efficacy to resist smoking score from baseline and outcome was noticed in the intervention group as this score was almost doubled (change in score = 5.27, $p < 0.02$), where a no difference in score was noticed in the control group (change in score = -0.84, $p < 0.34$).

Table 12 Change in Score of Asthma Knowledge and Self-Efficacy to Resist Smoking in the Groups From Baseline to Outcome (n = 244)

Study variable	Intervention*	Control		
	Change in score from baseline	Within group difference p	Change in score from baseline	Within group difference p
Asthma Knowledge	1.28	0.04	-0.74	0.12
Self-efficacy to resist smoking	5.27	0.02	-0.84	0.34

*SAS.PROC.MIXED adjusted (for 3 covariates) model was used

6.5 Summary of the Results

The results reported in this chapter demonstrate that there was a significant difference in scores on all outcome measures favouring the TAJ group in comparison to the control group. In other words, the intervention (TAJ) effectively improved asthma related quality of life, asthma-related knowledge, and self-efficacy to resist smoking for students with recent wheezing for the students in the intervention schools. Therefore, it can be concluded that this peer-led school-based asthma education program is beneficial in improving health-related outcomes among students with asthma in high schools in Jordan.

English proficiency level was moderate as expected, and was enough for students to understand the intervention and its resources. A relatively high number of students and their families were smokers so it was not surprising that the most commonly reported allergen was cigarette smoking.

Consistent with other literature from Jordan, asthma is potentially under diagnosed and under treated in Jordan. About one third of the sample had not been diagnosed as having asthma by a health professional or a doctor despite experiencing some asthma symptoms. Furthermore, only one third of the sample reported using asthma medications despite the fact that two thirds of the sample had been diagnosed as being an asthmatic by a health professional. Overall, high percentages of students in the study had experienced different asthma symptoms including sleep disturbances, wheezing with exercise, and dry cough at night, which could have affected their quality of life. Students were also troubled by respiratory problems, with one in three students reporting recurrent chest infections. Consequently, students' overall quality of life was moderate at baseline. Asthma-related knowledge was poor as students answered only half of the questions correctly at baseline. Similarly, self-efficacy to resist smoking among smokers in the study was also low as the students answered less than half of the questions correctly.

Three months after the intervention, students in the intervention group improved their score on quality of life significantly so that they reported only a mild impairment. The change in the mean score for both the symptom and the emotional domains was clinically and statistically significant. The symptom domain score improved the most followed by the emotional domain and the least improvement occurred in the activity domain in the intervention group. In contrast, no improvement at all was experienced in any domain in the control group. In addition, asthma-related knowledge improved significantly among students in the intervention group, versus no improvement in the control group. Self-efficacy to resist smoking improved significantly in the intervention group with no improvement at all in the control group. This improvement was both statistically and clinically significant, with students in the intervention group answering an average of seven more questions appropriately at outcome compared to the control group. The next chapter (Chapter Seven) discusses these results and explains them in the context of previous relevant literature.

Chapter Seven - Discussion

7.1 Introduction

This is the first study to evaluate the impact of a peer-led education program on adolescents with asthma in Jordan. In this chapter I will summarise and explain the main findings of the cluster randomised controlled trial and the process evaluation. I will discuss the factors that enabled the success of the modified Triple A program in Jordan as well as the strengths and limitations of the study. Given the high prevalence of asthma and smoking among adolescents in Jordan, I will highlight the need for programs such as TAJ. I will conclude this chapter by providing implications of clinical practice and future recommendations for research.

7.2 Summary of Major Findings

The results from this study showed that TAJ significantly improved asthma-related quality of life and other important health-related outcomes for Jordanian adolescents with asthma attending schools. In particular, students in the intervention schools reported that they had fewer negative effects of asthma symptoms and emotions on total quality of life at three months follow up. In contrast, no change occurred in students in the control schools. Moreover, both the scores on self-efficacy to resist smoking and knowledge related to asthma improved substantially in the intervention schools, again compared to no changes in the control group. These are important findings because it illustrates that Triple A can be successfully adapted to help adolescents with asthma in different cultures and contexts.

The improvements in quality of life achieved by the TAJ program were likely made more noticeable due to a combination of factors. Adolescent asthma proved to be more prevalent than previous reports would have led the researchers to expect, and in the absence of previous reports on quality of life the students reported higher symptoms and moderate impairment in asthma-related quality of life, with poor knowledge of self-management. In comparison to the published rate of 4.1% in 1996 (Abuekteish et

al., 1996), adolescent asthma prevalence rates appear to have tripled to 12.1% noted in the current study, while the prevalence of recent wheezing episodes among school students has nearly doubled. This confirms previous research findings suggesting a sharp increase in adolescent asthma prevalence in developing countries in the last decade (Lawson & Senthilselvan, 2005), particularly in the Middle Eastern countries such as Saudi Arabia (Al Frayh et al., 2001). In 1996 (Abuekteish et al.), one-third of asthma cases had a professional diagnosis, and over half of students in the current study was professionally diagnosed. This increase in prevalence could be due to increased labelling of asthma and better diagnosis or a real increase of the prevalence. Although there does appear to have been an increase in professional asthma diagnoses in Jordan, the current study confirms that the problem of under diagnosis in adolescent asthma in Jordan is still present.

Another factor that likely ensured that the effects of the TAJ program would be noticeable was the high prevalence of adolescent smoking in comparison to those in other countries like Australia (White & Hayman, 2006). Not surprisingly, students in the current study had a low degree of self-efficacy to resist smoking. In total, given the poor quality of life and the high smoking rates, the significant improvements demonstrated in this study indicate that the TAJ intervention meets the evident needs for asthma and smoking-related support. Furthermore, the student evaluations showed that adolescents, including those with asthma, welcomed the program, particularly the peer-led approach within the school setting and were therefore engaged in the process. Furthermore, school support from teachers was strong and the use of bilingual external trainers facilitated successful adaptation. Therefore, the TAJ program shows great promise for use with adolescents with asthma on an ongoing basis in Jordan, and potentially other countries. However, these effects occurred in the relatively short term of three months, so it is important to determine if these effects can be sustained in the longer term.

7.3 Peer-Led Education for Adolescents in Schools

The positive effects of the TAJ program on students' quality of life and asthma-related knowledge of self-management are consistent with previous reports on the

Triple A program (Gibson et al., 1998; Shah et al., 2001), the program from which TAJ has been adapted. This is not surprising as Triple A is a well-developed and rigorously evaluated program (Shah et al., 2001). Also, the resources and approaches used in the TAJ intervention were based on those in Triple A, such as the use of standardised, structured training manuals and the process of training peer leaders (APLs). However, the findings in this thesis confirm that, when modified for a different culture, Triple A is also successful.

One of the potential reasons for the program's positive effect on quality of life was the improvement reported in students' knowledge and awareness about asthma and related management. Previous research has shown a strong relationship between asthma-related knowledge, self-management, and overall quality of life (Abdulwadud et al., 2001; Barlow et al., 2002; Juniper et al., 1996; Sapp, 2003; Sin et al., 2005). It is likely that students knew more about appropriate asthma management, and therefore improved their management, resulting in enhanced quality of life, especially in the symptoms domain. This is not surprising, as researchers suggest that when education aims at improving self-management, the effects are likely to be noticed in the symptoms domain first, whereas other domains may need longer term follow-up to show significant improvement (Juniper et al., 1994). This is because symptoms, which lead to physical impairment, had impact on other domains (Annett, Bender, Lapidus, DuHamel, & Lincoln, 2001; Burkhart, Svavarsdottir, Rayens, Oakley, & Orlygsdottir, 2009; Rhee et al., 2007; Swahn & Bossarte, 2006). This improvement in the symptoms domain was more than previous reports, whereas improvements in other domains were similar (Shah, 2001).

In comparison to Triple A (Shah et al., 2001), the TAJ program led to greater improvement in quality of life, as measured by the PAQLQ. One possible explanation is that Jordanian adolescents with asthma had worse health and a relatively higher level of impairment in quality of life than the Australian students in Shah et al's study (Shah et al., 2001). The students involved in the current trial showed a moderate degree of quality of life deterioration due to asthma, confirming recent reports in Northern Jordan (Al-Akour & Khader, 2008) and overseas (Hazell, Frank, & Frank, 2003; Juniper et al.,

1996; Marklund, Ahlstedt, & Nordström, 2004; Matheson et al., 2002; Shah et al., 2001; Townsend et al., 1991). Students in the current study also reported less frequent use of asthma medications compared to adolescents in Shah's study, and this likely was related to more impairment in quality of life. However, another contributing factor is that asthma treatment is less comprehensive in Jordan than in Australia and is based mainly on health care professionals or hospital treatment. Additionally, there have been significant efforts in Australia to raise public awareness of asthma, such as the National Asthma Campaign (Comino et al., 1997), and that asthma has been a National Health Priority Area in Australia since 1999 (AIHW). By contrast, there have not been similar efforts to raise public awareness about asthma in Jordan, and this lower level of awareness could affect treatment-seeking behaviour, such as doctor's visits for regular checkups as well as adherence to asthma medications.

The knowledge obtained through the work outlined in this thesis also builds on the results of Shah and her colleagues regarding smoking prevention in adolescents with asthma (Gibson, et al., 1998; Shah, et al., 2001). While both studies looked at the effect of the program on smoking, the trial reported in this thesis also assessed students' self-confidence for smoking avoidance. Scores on self-efficacy to oppose smoking were doubled among students with asthma in the TAJ schools, while those in the control group showed no improvement. This is an important finding given the high prevalence of smoking (27.7%) in students with asthma and their families, with two thirds having at least one smoker in the family in the current study. While the smoking prevalence is not surprising as it is similar to earlier reports in Jordan (Haddad & Malak, 2002; WHO, 2000), the increased rate identifies a problem that is important to treat. The prevalence of adolescent smoking in Jordan is much higher than in Australia for instance, where the prevalence has remarkably decreased from 10% to 4% among 12-15 years old students from 1999 to 2005 (White & Hayman, 2006).

Despite the effects smoking may have on asthma exacerbations (de Benedictis & Bush, 2007; Morfin-Maciel et al., 2006; Navon et al., 2005; Van De Ven, Engels, Otten et al., 2007), it seems that having asthma was not a strong motivation for students in Jordan to quit smoking (Zimlichman et al., 2004), probably due to the perceived

desirability of smoking behaviour (Kobus, 2003) and the sense of peer acceptance smoking may have provided (Brownell & Gifford-Smith, 2003; Haynie, 2002). This sense of belonging is particularly important for adolescents with asthma, who already perceive themselves as different from peers and therefore try to "fit in" within a peer group, even to the extent of adopting risky behaviours (Gettinger, 2003).

The current study also confirms that adolescents can teach their peers and be capable allies and responsible partners in health promotion programs when they are given an opportunity. Evidence from Triple A and health-related education programs for adolescents that are based in schools and led by peers suggests that peers are effective in providing health-related education for school peers. These programs have been mainly aimed at preventing or reducing the prevalence of smoking and drugs and alcohol in a variety of areas (Cuijpers, 2002; Mellanby et al., 2000). Both of these reviews confirm that adolescents are able to disseminate health-related messages to their peers in the school setting and can be at least as effective as adult educators in changing peers' health behaviours and knowledge. The positive effects of entrusting adolescents as allies in educating school peers are likely to extend to other contexts, because adequately trained and skilled peer educators may continue to disseminate asthma and smoking messages outside of school and even after they finish school.

Regardless of the approach, peers can be effective health promoters, but peer training needs to be tailored to specific circumstances. In particular, peer supporters have been successful in lowering smoking prevalence in high schools in programs such as the ASSIST (A Stop Smoking In Schools Trial) program in the UK (Audrey et al., 2006). Compared to the approach used in TAJ, the method of teaching in ASSIST was informal, less structured, not classroom based, and not supervised by adults (Audrey et al., 2006). While this approach significantly reduced the prevalence of smoking, more formal and supervised techniques were required for TAJ because it included management of a chronic illness, appropriate use of medications, and emergency treatment plans. The approach used in TAJ was also classroom-based, whereas the method used in ASSIST involved informally passing information to student peers mainly outside classroom (Walker & Avis, 1999). These variations highlight the need

to match the approach used to train peers to the intent, nature, and complexity of the health messages that need to be disseminated within the peer group culture (Story et al., 2002). Consistent with previous reports, the formal supervised approach used in TAJ maximised the accuracy of information and appropriateness of behaviours by peer educators (Adamchak, no date; Gallant & Maticka-Tyndale, 2004; Story et al., 2002; Walker & Avis, 1999).

7.4 Key Components of TAJ Program

The significant improvements in the study outcomes are likely due to a powerful combination of crucial elements. These elements include the incorporation of universally applicable principles and approaches in the program model, which are also therefore likely to have widespread application. These principles acknowledge the importance of influential peers and the school social context in increasing adolescents' self confidence and empowering them to take appropriate action for better health-related outcomes. The role of these factors in the program's success is discussed below.

A key ingredient of the TAJ program is the active involvement of the school and peers (Brownell & Gifford-Smith, 2003; Cohen et al., 2003; Evans et al., 2001; MacDonald, 2003; Urdan & Schoenfelder, 2006). This approach acknowledges the importance of the school context, where adolescents with asthma often try new behaviours. Implementing the TAJ program in schools using peer educators facilitated the reinforcement of health-related messages through consistent social contacts (Cohall et al., 2007; McCann et al., 2006).

Using schools as the site of implementation also allowed the program to widely disseminate key asthma and smoking messages through a "cascade" (Turner, 1999). In the cascade technique, trained peer leaders (year 11) received training by external trainers and then educated younger students (year 10), who in turn delivered the asthma and smoking messages to younger students (years 7 and 8). The cascade thus involved both active learning (year 11 and year 10 students) and passive learning (year 7 and year 8 students), and the effect of the program was similar for both groups of learners.

By using the school setting in the TAJ program, important asthma and smoking information reached a large number of pupils in the community, including family members (Ennett & Bauman, 1996).

As mentioned in Chapter Three, there are few school-based programs designed for adolescents with asthma (Berg et al., 2004; Bruzzese et al., 2004; Bruzzese et al., 2008; Shaw et al., 2005; Valeros, Kieckhefer, & Patterson, 2001b). Unlike TAJ, these programs use health professionals rather than peers as facilitators. Positive findings from piloting these interventions have been reported in regards to asthma-related knowledge, adherence and skills of self-management, and overall health status (Berg et al., 2004; Bruzzese et al., 2004; Bruzzese et al., 2008; Shaw et al., 2005) and quality of life (Bruzzese et al., 2004). However, to the best of the researcher's knowledge, these programs have not been evaluated in randomised controlled trials, therefore their effects still unclear, making comparison to TAJ difficult.

Aside from taking advantage of the school context, utilising the social importance and high credibility of influential peers in combination with universal concepts was the most significant element that facilitated the "cascade" learning and teaching technique. Peer educators directly encouraged students with and without asthma to improve their asthma-related knowledge and their capacity to adhere to self-management tasks and quit smoking. This is particularly important because most adolescent behaviours, such as smoking, are typically initiated and encouraged by negative peer pressure (Zbikowski et al., 2002). The finding of increased self-efficacy to resist smoking among TAJ participants thus affirms the positive persuasive role of peers as role models in improving adolescents' knowledge and self-confidence to change risky behaviours (Bandura, 1984; Elliott & Lambourn, 1999; Green, 2001; Turner, 1999).

Moreover, using peer persuaders to deliver messages about asthma and smoking also made these messages more legitimate for the TAJ students, since adolescents place more trust in peer knowledge than adult knowledge (Topping, 1996; Turner, 1999; Turner & Shepherd, 1999). This could partially explain the findings of the reviews

mentioned earlier, which found that peer-led education programs within the school context were often more effective than similar adult-led programs in improving peers' knowledge and changing health behaviours (Cuijpers, 2002; Mellanby et al., 2000). Importantly, the strategy of using volunteer peer educators was employed to enhance the intervention's effectiveness (Green et al., 1980). This is because the voluntary participation approach in TAJ provided a chance to involve more youth in the peer educator process, including students that belong to certain peer groups. By doing this, the benefit of such programs is maximised to reach students within peer groups that often involve risky behaviours (Audrey et al., 2008; Sussman et al., 2007). In contrast, when the teacher or peer nomination process is used, peer educators that are high academic achievers or social leaders in the class are often selected, thus limiting the opportunity of a diversity of adolescents' participation (Story et al., 2002).

Another important principle that potentially enhanced TAJ's success was the use of peers in multiple ways, acknowledging adolescents' unique development. This includes recognising the need for peer group acceptance and belonging (Brownell & Gifford-Smith, 2003; Haynie & Osgood, 2005; Lashbrook, 2000) as well as the expansion in their cognitive abilities (Steinberg, 2005). The process evaluation suggests that the empowerment approach (Freire, 1970) enabled students with asthma to feel more accepted and supported by peers, less embarrassed about their condition, and a greater sense of belonging to the school population. It is likely that empowering students with asthma by increasing the school community's awareness about asthma, led to better self-management. Previous research confirms the positive relationship between both social support and feeling of control and self-management attitudes and behaviours (Cohen et al., 2003; Sin et al., 2005; Zebracki & Drotar, 2004).

The role of emotional status in increasing quality of life in adolescents with asthma has also been highlighted in previous reports (Burkhart et al., 2009). As TAJ delegated the authority of education to adolescents and their peers, the program utilised the expansion occurring in their learning abilities and the interaction between cognition and emotion processes, especially in the context of peer-peer relations (Paus, 2005; Steinberg, 2005). The TAJ program also recognised adolescents' desire to be

independent in making decisions, acknowledging other social influences, such as peer pressure.

Finally, the incorporation of well-recognised concepts in the content of the program, particularly human agency and self-efficacy (Bandura, 1984) may have enhanced peer educators' success. The use of the human agency concept is well-illustrated in the use of students with asthma being actively engaged in their own education and changing their behaviour through actions and decisions (Bandura, 1986; Pajares, 2002). Incorporating such theories in similar educational programs is consistent with previous researchers' recommendations of integrating well-established theories when designing educational interventions for adolescents with asthma (Clark & Starr-Schneidkraut, 1994; Heale & Griffin, 2009; Kintner, 2007; Tobler et al., 2000; Velsor-Friedrich et al., 2004). Targeting TAJ participants' self-efficacy in several activities led to an improvement in their knowledge about asthma and related self-management, and increased their confidence to undertake and persist to asthma self-management tasks (Bandura, 1984).

Other elements that were included in the TAJ model were recommended in the literature yet not typically seen in traditional asthma education programs, such as a focus on smoking prevention (Bush et al., 2007; Van De Ven, Engels, Otten et al., 2007), quality of life (Wolf, Guevara, Grum, Clark, & Cates, 2003), and integration of creative learning and teaching activities (Tobler et al., 2000; Velsor-Friedrich et al., 2004). The inclusion of these elements makes TAJ a good complement to other aspects of traditional asthma care and other adolescent education programs. For instance, TAJ may enhance the effectiveness and adherence to the advice and written self-management plans provided by health professionals, although this was not investigated in the current study.

In total, the use of general, recognised principles may be a factor in the program's adaptability and success in a different context and culture. The success of TAJ lends support to the universality of these concepts and suggests the need for a theoretical basis for interventions. Interestingly, students participated in the initial

process evaluation liked the fact that the Triple A program was English-based. In fact Asthma Peer Leaders (APLs) reported that one of the main motivations for participation in the program was to practice and learn more English. This is an interesting finding as the researcher initially thought that the use of English language might be a barrier to fully implementing Triple A and the related resources in a country where Arabic is the first language. Instead, using English language was identified as a strength because students were attracted to participate in the program. This is an important point to consider when adapting Triple A and similar English-based programs in non-English speaking countries, where English is a school subject. For instance, in Jordan, like many other countries, English is taught to all students, therefore, participation is not limited by language. However, following the process evaluation, specific cultural modifications were necessary, so that the program would suit the Jordanian school context. Such modifications through adaptation process are known to be important (Boyer et al., 2007; Simmons et al., 2002). One key alteration was the addition of external bilingual and bicultural trainers who are familiar with the Jordan context (Bronheim et al., 2003), as adolescents prefer people who can identify and recognise. This was evident through piloting Triple A when APLs reported that they liked the style of the trainer, who was a local health care professional.

7.5 Strengths and Limitations of the Study

The study in this thesis has several strengths. An important strength was the choice of a cluster randomised, controlled design, which is suitable for school-based interventions (Murray et al., 2004). The sample size was large enough to provide adequate power and schools were stratified by gender to ensure adequate participants of males and females. Adjustments were made to account for cluster effects in the analysis, which is not always undertaken consistently in such research (Scheier et al., 2002). As students in the control group were potentially sicker than those in the intervention schools at baseline, these differences were also accounted for in the analysis. The program, which uses universal theories and principles, was tested for feasibility in a process evaluation and adapted for the Jordanian cultural context prior to the trial. A strength of the study may lie in the use of validated Arabic versions of all questionnaires barring the CQ to ensure maximum accuracy of data. It is vital to

validate and further test an Arabic version of the CQ in future research. The questions related to self-perceived possible allergens have not been previously tested and the quality of the data is not clear particularly from those who never have had allergy testing.

Despite the above mentioned strengths, the study also has a few limitations. One limitation was that most of the data collected was self-reported by participating students. In regards to the degree of accuracy of asthma diagnosis, approximately, one third of participants reported asthma symptoms without being diagnosed by health professionals; therefore these symptoms could have misrepresented the level of the disease. However, the findings in this study were consistent with previous findings in Jordan that used medical records to identify adolescents with professional diagnosis of asthma (Al-Akour & Khader, 2008). Relying only on medical records has led to under-recognition of asthma prevalence, because students without a professional diagnosis will not be counted, whereas such students may be identified if the self-report method is used. Another limitation is the lack of a longer-term follow up, so it is not clear whether the program effects can be sustained or the length of time.

Furthermore, data collection at baseline occurred in winter when asthma symptoms are usually worse (Clark et al., 2000; Hayashi et al., 1995), whereas outcome data collection was undertaken during spring. This variation in weather may have inflated the program's impact on students' overall quality of life. However, this is unlikely because quality of life of students with asthma in the control school did not improve by the outcome suggesting that there was no impact on weather on asthma status. Since students with asthma were recruited from one city in Jordan, a limitation relates to generalisability of the findings to the broader community. Also, the low value of Cronbach's alpha for the CQ questionnaire found in the current study highlights a potential weakness in the instrument, however, when two items removed, the overall reliability improved, as with previous studies (Kritikos et al., 2005). Nonetheless, Cronbach's alpha is only one measure that determines the reliability of the scale.

It would have been a stronger design if the students in the control group had some activities unrelated to asthma to equalise the effects of treatment. However, the resources for this doctoral study were limited and therefore did not allow this to occur. In addition, subgroup analysis was not performed to determine whether the intervention worked equally well for those students with and without a diagnosis of asthma, however, it would be interesting to measure this in future research.

While change in asthma-related knowledge is necessary, it may not be sufficient to result in behaviour change or in reduction of symptoms. For instance, improvement in quality of life may not necessarily reflect an increase in asthma self-management behaviours for adolescents with asthma. Measuring management behaviours and not just knowledge of asthma management would be crucial to consider in future research. One important way to measure the effectiveness of the adolescents' management of their asthma is by assessing health care utilisation. This was not assessed in this thesis and measuring this outcome would be an important development of this research. It should be acknowledged however that data regarding health care utilisation should be interpreted carefully, as visits to clinics or medical specialists may increase noticeably directly after implementing educational programs as a reflection of appropriate improvements in asthma awareness and seeking medical advice.

7.6 Implications for Clinical Practice

The successful adaptation of the Triple A program indicates that school-based, peer-led educational programs such as Triple A and TAJ, which use principles and techniques that are universally applicable, are successful and can be adapted to different cultures and contexts. It is not surprising therefore that there is an international interest in adapting Triple A in the USA, Canada, Germany, and Singapore (Shah et al., 2008a). The TAJ model offers an effective, practical approach for asthma and smoking education and could be potentially applied to other school-based adolescent health-related issues or health promotion initiatives in Jordan and overseas, such as diabetes and obesity (Audrey et al., 2006). As anticipated, the TAJ program was equally effective for male and female students with no noticeable differentiation between the two. Therefore, the effect of the intervention is equivalent in unisex schools to coeducational schools (Shah et al., 2001).

Cost is an important aspect in the TAJ program adoption and sustainability. Unfortunately, there is limited and conflicting data about the cost of similar adolescent peer-led programs that are based in schools, with some studies indicating that they are relatively cheaper than similar adult-led programs (Green, 2001). In contrast, other reports claim that such programs may not be relatively cost-effective because they require skilled and committed adult support and supervision in order to work successfully (Turner, 1999; Walker & Avis, 1999). However, partnerships with other organisations such as universities can help reduce costs and are important for the program's sustainability (Turner, 1999), therefore these strategies should be considered in intervention research. For example, the Triple A program in Australia is offered as an elective for university students studying pharmacy, medicine, and nursing, and also as a curriculum subject for pharmacy students (Shah et al., 2008a). This is a good way of finding effective trainers for peer leaders at little to no cost.

Training of educators and students, the time required for training and implementation, and program resources are the main issues that need to be considered in relation to the cost of school-based, peer-led programs. In regards to the costs of implementing Triple A, an experienced personnel who is familiar with Triple A and has adequate knowledge about asthma management is required to train Triple A educators, who in turn will train students to be peer leaders. Training the trainers can usually be provided through a one-day workshop to provide knowledge and skills regarding asthma management and to increase familiarity with Triple A cascade. The trained research leader then needs to train one or two research assistants over a one day workshop in order to help in co-facilitating Triple A training workshop for educators. Triple A educators can be any volunteer medical, pharmacy, or nursing students that can be approached through partnership with universities and trained over a one day workshop at little to no cost as mentioned above. Implementing the three steps of Triple A cascade in schools usually takes up to six days, which need to be chosen in consideration of the school timetable. Triple A resources that are needed for training are all available through the Asthma Foundation website (<http://triplea.asthma.org.au>), where free copies of Triple A video that includes three educational short films, training manuals, evaluation forms, power point presentations, and peer leaders' manuals can be

downloaded with only photocopying costs. Other props needed to train students including spacers, placebo medications, and airway models can also be provided through partnership with universities, teaching hospitals, or local community centres, and some equipment can be made by the students themselves. In total, Triple A and TAJ are both cost-effective given the free access to most related resources and potentially program educators. Importantly, the cost of asthma, which often results in high economic burden because of the increased health care utilisation, could be substantially decreased when implementing programs similar to Triple A and TAJ (Lozano et al., 1999).

Nonetheless, before implementing peer-led education programs that are school-based, health care professionals should negotiate time with school principals and schoolteachers to train peer educators and implement the intervention. This is important to ensure minimal interference with the school educational curriculum and therefore no interruptions to important classes of participating students, although time out of class concerns students, parents and principals. The total approximate time costs for students was 10 hours for APLs, three hours for year 10, and one hour for the whole school. Importantly, schoolteachers need to be educated about the program in order to raise their commitment and support during the implementation process, especially when schools recognise the need to include TAJ into the school curriculum.

Aside from the success of TAJ, the current study revealed alarming issues related to adolescent asthma in Jordan that need to be addressed carefully when providing interventions and education for adolescents with asthma. These issues include the high prevalence of adolescent smokers in comparison to other countries (White & Hayman, 2006) especially given the established relationship between smoking and adolescent asthma, the lack of asthma medication use, especially preventers, and the poor quality of life reported. These issues should provide impetus for health care professionals to actively implement interventions like Triple A, which create a culture that inhibits smoking in schools and improves asthma self-management behaviours. While recognising the positive effects of TAJ, it should be noted that such programs can work best in conjunction with other asthma interventions, which are

currently lacking in Jordan. Such interventions should include Jordanian families especially because of the high prevalence of family smokers reported in this thesis as well as the role that parents play in managing adolescent asthma in Jordan. This includes taking their children to hospital in case of asthma exacerbation and buying related medications when needed. The likely ripple effect of TAJ is potentially promising and can be a step forward in raising awareness in families and communities about the problem of adolescent asthma and smoking.

Given the potential problem of underdiagnosis highlighted in this thesis, health care professionals should be able to identify adolescents who might be under-recognised or inappropriately treated. These adolescents are often admitted to hospital through the emergency department for an asthma exacerbation, and usually have poor self-management. However, health care professionals need to be aware that providing education that only aims at improving knowledge about asthma and related management is often not enough for adolescents to adhere to self-management tasks. Therefore, multidisciplinary efforts and liaison should be developed between schools and health care professionals to ensure providing appropriate support and education that tailors adolescents' needs and unique developments.

7.7 Future Recommendations

Several aspects related to adolescent asthma in Jordan have been recognised as warranting further research or important elements to consider in relation to adolescent asthma intervention research. Research is needed that identifies the prevalence of adolescent asthma in Jordan using more valid diagnostic instruments to validate the findings in this thesis. TAJ was only implemented in one urban city in Jordan, Irbid, and testing the effectiveness of TAJ should include samples that are representative of other areas in Jordan to ensure the generalisability of findings. This means trialling the program in both rural and urban areas in Jordan.

While the effects of the TAJ were evaluated at three months follow-up, it would be interesting to test the effects six-to 12 months later to see how long the positive

impact persists and if 'booster' interventions or repetition of the program would be necessary. This is also important to see whether long term follow up would detect significant changes in the activity domain, as it has not been significantly improved in comparison to the symptoms or the emotions domains. Furthermore, the program can also be an important adjunct to existing asthma programs and treatment plans both in Jordan and overseas. For example, students with increased asthma-related knowledge may visit the doctor more regularly or may adhere to written self-management plans and these outcomes would also be worth investigating.

Quality of life and self-efficacy to resist smoking are very important measures for overall self-management of adolescents with asthma, therefore these outcomes need to be included in adolescent asthma research. Also, when designing programs for adolescents with asthma, researchers should recognise unique adolescents' developments including the increased peer relations, particularly those within school, and resulting influence in shaping adolescents' health-related behaviours. Moreover, according to the pilot findings, there appear to be benefits for peer educators and it would be worthwhile assessing those benefits in future research.

This thesis demonstrates that it is possible to identify adolescent asthma in schools through self-report instruments, which may serve as a reliable indicator of asthma status, particularly for adolescents that have limited access to proper medical diagnostics facilities. Future research that is based in schools and uses cluster randomised design should also adjust for clustering in the analysis to avoid overestimation of the interventions' effect. Gender subgroup analysis, although not explored in this thesis, should also be performed to determine the differential impact of Triple A in both genders, as previous research showed some differences in the program effect on both genders (Shah et al., 2001).

Chapter Eight - Conclusion

8.1 Thesis Review

This thesis reports the results of a cluster randomised, controlled trial of a promising school-based, peer-led educational program for adolescents with asthma. This program (TAJ) has been adapted from the Adolescent Asthma Action (Triple A), a specifically developed program that acknowledges adolescents' needs and developments. The purpose of the intervention in this study was to improve asthma-related quality of life, knowledge related to self-management of asthma, and self-efficacy to resist smoking among Jordanian students with asthma in high schools.

Peer-led education programs that are based in schools have been shown to be effective in utilising peer pressure in a positive manner to change health-related behaviours of adolescents. These programs acknowledge the importance and high credibility of influential peers and school context in shaping behaviours of adolescents, who need to be accepted and belong to social peer groups. Such programs were found to be at least as effective as similar programs that were led by adults in improving peers' knowledge, and more effective in changing peers' health-related behaviours.

Adolescent asthma is a highly prevalent and persistent chronic disease globally and in the Middle East as well. Adequate self-management of adolescent asthma can be achieved through actively involving peers to provide education and support for adolescents with asthma within the school setting. Such programs are considered necessary because of the potential impact of asthma, if left inappropriately managed, on the quality of adolescents' daily lives, including school attendance and performance. This thesis therefore demonstrated that adolescence could be a good opportunity to teach adolescents how they can better self-manage asthma and avoid smoking, which is strongly influenced by negative peer pressure.

Triple A has been shown to be effective in improving asthma-related quality of life and knowledge, and reducing school absences in high schools in Australia, where the program was developed and rigorously evaluated. In contrast to traditional asthma interventions that showed mixed and inconsistent evidence of effectiveness, Triple A incorporated important principles including human agency, self-efficacy, and empowerment into the "cascade" technique, in which trained peers educate slightly younger peers about asthma and smoking. This thesis highlighted the need for programs similar to Triple A to help Jordanian adolescents with asthma adequately self-managing their condition in light of the absence of literature and guidelines available.

8.2 Summary of Findings

The modified Triple A (TAJ) significantly improved all outcome measures, while no change occurred in students in the control group. It is clear that programs such as Triple A and TAJ that aim at improving self-management of asthma are needed in Jordanian high schools as asthma was prevalent and affected students' quality of life. In addition, asthma-related knowledge among students with asthma is relatively poor and smoking rates are high. The Triple A cascade was found feasible in the Jordanian schools, well-received by students and teachers, and successfully adapted to the Jordan context. The presence of external bilingual trainers was crucial in enhancing the program's success. The program was successful in empowering students with asthma to feel more supported and accepted by peers and less embarrassed about their condition. Therefore, the results confirm that when modified for a different culture, Triple A remains successful.

Regardless of the program approach, adolescents can be capable and responsible peer educators when they are adequately trained. The nature and intent of the program, however determine the method and intensity of peer training and adult supervision. Peer leaders in TAJ disseminated important messages about asthma medications and emergency plans thus those peer educators received a structured and intensive training. Importantly, the findings of this thesis explored the likely combination of crucial factors that enabled the program's effectiveness, including universal principles and approaches that acknowledge adolescents' needs and

developments. The school setting and peers within the school were very valuable in promoting appropriate self-management behaviours. The constant, regular contact with credible peers made their asthma and smoking messages persuasive. The use of empowerment strategy enabled students with asthma to feel more supported and accepted by peers, whereas the use of human agency and self-efficacy were also effective in increasing students' self-capacity to undertake and persist to self-management tasks.

In conclusion, the findings presented in this thesis are promising and exciting and make a unique contribution to future adolescent health-related research both in Jordan and overseas. It is vital that similar programs like Triple A will be developed because of the need for such programs in Jordan given the lack of adequate interventions for adolescents with asthma. When designing peer-led education programs, the incorporation of a developmental and socio-contextual framework is crucial for the program's success. The knowledge gained from this study will also provide impetus for larger studies to determine if the effects reported by Jordanian adolescents are representative in different contexts and potentially for various health-related issues in adolescence.

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Appendix A – Ethical Approval from Ministry of Education in Jordan

APPENDIX A



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
وزارة التربية والتعليم



٣٥٧٩٤

الرقم: ٢٥ / ١٥ / ١٤٤٥ هـ الموافق ١١ / ١٠ / ٢٠٠٤

السيد مدير التربية والتعليم لمنطقة إربد الأولى
السيد مدير التربية والتعليم لمنطقة إربد الثانية
السيد مدير التربية والتعليم لمنطقة إربد الثالثة

الموضوع : البحث التربوي

السلام عليكم ورحمة الله وبركاته،

تقوم الطالبة نهية عدنان يوسف الشياح بإعداد دراسة بعنوان " Evaluation of the effects of apeer-led asthma health-education program in improving quality of life and other related health outcomes among adolescents attending high schools in northern jordan"، وذلك استكمالاً لمتطلبات الحصول على درجة الدكتوراه في التمريض من الجامعة التكنولوجية في استراليا، ويحتاج ذلك تطبيق أداة دراستها المكونة من استبانة على عينة من طلبة المدارس التابعة لمديريتك. يرجى تسهيل مهمة الطالبة المذكورة وتقديم المساعدة الممكنة لها.

مع وافر الاحترام

وزير التربية والتعليم

الدكتور فهد سليمان القطر

مدير التطويرات التربوية

نسخة / الأنسة رئيس قسم البحث التربوي
نسخة / للملف ١٠/٣

Appendix B – Ethical Approval from UTS Ethics Committee

23 August 2006

Associate Professor Robyn Gallagher

KG05.02.92

Faculty of Nursing, Midwifery and Health

UNIVERSITY OF TECHNOLOGY, SYDNEY

Dear Robyn,

UTS HREC REF NO 2006-214 – GALLAGHER, Associate Professor Robyn, CRISP, Professor Crisp, SHAH, Dr Smita (for AL-SHEYAB, Ms Nihaya PhD student) - “Evaluation of the impact of a peer-led health education approach on health outcomes of students with asthma and on cigarette smoking among high school students in Northern Jordan”

Thank you for your response to my email dated 15 August 2006. Your response satisfactorily addresses the concerns and questions raised by the Committee, and I am pleased to inform you that ethics clearance is now granted.

Your clearance number is UTS HREC REF NO. 2006-214A

Please note that the ethical conduct of research is an on-going process. The National Statement on Ethical Conduct in Research Involving Humans requires us to obtain a report about the progress of the research, and in particular about any changes to the research which may have ethical implications. This report form must be completed at least annually, and at the end of the project (if it takes more than a year). The Ethics Secretariat will contact you when it is time to complete your first report.

I also refer you to the AVCC guidelines relating to the storage of data, which require that data be kept for a minimum of 5 years after publication of research. However, in NSW, longer retention requirements are required for research on human subjects with potential long-term effects, research with long-term environmental effects, or research considered of national or international significance, importance, or controversy. If the data from this research project falls into one of these categories, contact University Records for advice on long-term retention.

If you have any queries about your ethics clearance, or require any amendments to your research in the future, please do not hesitate to contact the Ethics Secretariat at the Research and Innovation Office, on 02 9514 9615.

Yours sincerely,

Professor Jane Stein-Parbury

Chairperson

UTS Human Research Ethics Committee

Appendix C – Instruments Used in the Study

a) *The Core Questionnaire for Wheezing and Asthma (CQWA)*

1. Have you ever had wheezing or whistling in the chest at any time in the past? ☐ Yes ☐ No
If you have answered 'No' please skip to question 6
2. Have you had wheezing or whistling in the chest in the last 12 months? ☐ Yes ☐ No
If you have answered 'No' please skip to question 6
3. How many attacks of wheezing have you had in the last 12 months? ☐ None ☐ 1-3
If you have answered 'No' please skip to question 6 ☐ 4-12 ☐ > 12
4. In the last 12 months, how often on the average, has your sleep been disturbed due to wheezing?
☐ Never woken with wheezing
☐ less than one
☐ night per week
☐ one or more nights per week
5. In the last 12 months, has wheezing ever been severe enough to limit your speech to only one or two words at a time between breaths? ☐ Yes ☐ No
6. Have you ever had asthma? ☐ Yes ☐ No
7. In the last 12 months, has your chest sounded wheezy during or after exercise? ☐ Yes ☐ No
8. In the last 12 months, have you had a dry cough at night apart from a cough associated with a cold or flu? ☐ Yes ☐ No

b) Paediatric Asthma Quality of Life Questionnaire (PAQLQ)

PAEDIATRIC ASTHMA QUALITY OF LIFE QUESTIONNAIRE PATIENT ID _____

SELF-ADMINISTERED DATE _____

Page 1 of 5

ACTIVITIES

Because you have asthma, you may have found some of the things you like doing difficult or not much fun.

We want you to think about all the things that you do in which you have been bothered by your asthma.

Some people are bothered by asthma when doing some of the following activities. Please read through the list. Think about how your asthma has bothered you during the last week.

On the next page, write down the **three (3)** things in which you have been bothered **most** by your asthma during the last week. These things must be activities that you will be doing regularly during the study. The three activities you choose can be from this list or you can think of other activities as long as you do them regularly.

1. BALL HOCKEY	19. WALKING UPSTAIRS
2. BASEBALL	20. LAUGHING
3. BASKETBALL	21. STUDYING
4. DANCING (BALLET/JAZZ)	22. DOING HOUSEHOLD CHORES
5. FOOTBALL	23. SINGING
6. PLAYING AT RECESS	24. DOING CRAFTS OR HOBBIES
7. PLAYING WITH PETS	25. SHOUTING
8. PLAYING WITH FRIENDS	26. GYMNASTICS
9. RIDING A BICYCLE	27. ROLLERBLADING/ROLLERSKATING
10. RUNNING	28. SKATEBOARDING
11. SKIPPING ROPE	29. TRACK AND FIELD
12. SHOPPING	30. TOBOGGANING
13. SLEEPING	31. SKIING
14. SOCCER	32. ICE SKATING
15. SWIMMING	33. CLIMBING
16. VOLLEYBALL	34. GETTING UP IN THE MORNING
17. WALKING	35. TALKING
18. WALKING UPHILL	

Write your **3** activities on the next page.

PAEDIATRIC ASTHMA QUALITY OF LIFE QUESTIONNAIRE

PATIENT ID

SELF-ADMINISTERED

DATE _____

Page 2 of 5

On the lines below, please write down the 3 activities in which you have been bothered **most** by your asthma. We then want you to tell us how much you have been bothered doing these things **during the last week because of your asthma.**

Put an X in the box that best describes how bothered you have been.

HOW BOTHERED HAVE YOU BEEN DURING THE LAST WEEK?

[illegible]

IN GENERAL, HOW OFTEN DURING THE LAST WEEK DID YOU:

[illegible]

PAEDIATRIC ASTHMA QUALITY OF LIFE QUESTIONNAIRE

PATIENT ID _____

SELF-ADMINISTERED

DATE _____

Page 4 of 5

IN GENERAL, HOW OFTEN DURING THE LAST WEEK DID YOU:

[illegible]

HOW BOTHERED HAVE YOU BEEN DURING THE LAST WEEK BY?

[illegible]

IN GENERAL, HOW OFTEN DURING THE LAST WEEK DID YOU:

[illegible]

PAEDIATRIC ASTHMA QUALITY OF LIFE QUESTIONNAIRE PATIENT ID _____

SELF-ADMINISTERED DATE _____

Page 5 of 5

THINK ABOUT ALL THE ACTIVITIES THAT YOU DID IN THE PAST WEEK:

	Extremely Bothered	Very Bothered	Quite Bothered	Somewhat Bothered	Bothered A Bit	Hardly Bothered At All	Not Bothered
	1	2	3	4	5	6	7
22. How much were you bothered by your asthma during these activities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

IN GENERAL, HOW OFTEN DURING THE LAST WEEK DID YOU:

	All of the Time	Most of the Time	Quite Often	Some of the Time	Once in a While	Hardly Any of the Time	None of the Time
	1	2	3	4	5	6	7
23. Have difficulty taking a DEEP BREATH?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DOMAIN CODE:**Symptoms: 4, 6, 8, 10, 12, 14, 16, 18, 20, 23****Activity Limitation: 1, 2, 3, 19, 22****Emotional Function: 5, 7, 9, 11, 13, 15, 17, 21**

C) Consumer Asthma Knowledge Questionnaire (CQ)

- | | | | |
|-----|---|----------------------------|-----------------------------|
| 1. | You can become addicted to asthma medications if you use them all the time. | <input type="radio"/> True | <input type="radio"/> False |
| 2. | An asthma action plan can prevent hospitalizations due to asthma. | <input type="radio"/> True | <input type="radio"/> False |
| 3. | When you know that you are going to be exposed to something that triggers your asthma, you should take the recommended medication just before exposure. | <input type="radio"/> True | <input type="radio"/> False |
| 4. | When you know that you are going to be exposed to something that triggers your asthma, you should wait until you develop symptoms before taking medication. | <input type="radio"/> True | <input type="radio"/> False |
| 5. | Side effects are less likely with inhaled medications than with tablets. | <input type="radio"/> True | <input type="radio"/> False |
| 6. | With preventer medications, it does not matter if some doses are missed or if you go on and off them. | <input type="radio"/> True | <input type="radio"/> False |
| 7. | If you get a cold or flu, you should increase your asthma medications. | <input type="radio"/> True | <input type="radio"/> False |
| 8. | Some medications can trigger asthma attack. | <input type="radio"/> True | <input type="radio"/> False |
| 9. | You should use “preventer medication” when you have an asthma attack. | <input type="radio"/> True | <input type="radio"/> False |
| 10. | Going from a cold to hot environment can trigger asthma, but going from a hot to cold environment does not trigger asthma. | <input type="radio"/> True | <input type="radio"/> False |
| 11. | Parents should give “reliever medications” to a child as soon as they recognise the first sign of asthma. | <input type="radio"/> True | <input type="radio"/> False |
| 12. | Blue puffer (Ventolin), Brown puffer (Flixotide), and Green puffer (Servent) are called “preventer medications”, so they should be used everyday although you are well. | <input type="radio"/> True | <input type="radio"/> False |

***d) Self-Administered Nicotine-Dependence Self-Efficacy Sub-Scale
(SANDSES)***

- | | | | |
|-----|---|---------------------------|--------------------------|
| 1. | Would you be able to refrain from smoking if you were bored or depressed? | <input type="radio"/> Yes | <input type="radio"/> No |
| 2. | Is the thought of not being able to smoke threatening to you? | <input type="radio"/> Yes | <input type="radio"/> No |
| 3. | Do you think you would become depressed if you stopped smoking? | <input type="radio"/> Yes | <input type="radio"/> No |
| 4. | Are you afraid that if you stop smoking a stressful situation would cause you to start smoking again? | <input type="radio"/> Yes | <input type="radio"/> No |
| 5. | Do you think you would be able to refrain from smoking in situations that make you anxious? | <input type="radio"/> Yes | <input type="radio"/> No |
| 6. | Do you typically engage in activities that center around or involve smoking? | <input type="radio"/> Yes | <input type="radio"/> No |
| 7. | Do you get panicky when you run out of cigarettes? | <input type="radio"/> Yes | <input type="radio"/> No |
| 8. | Would you be able to refrain from smoking even though others around you were smoking? | <input type="radio"/> Yes | <input type="radio"/> No |
| 9. | Do you ever chain-smoke? | <input type="radio"/> Yes | <input type="radio"/> No |
| 10. | Are you extremely upset when you are not allowed to smoke (for example, in a hospital, on a plane, in a restaurant or theatre)? | <input type="radio"/> Yes | <input type="radio"/> No |
| 11. | Would you be able to get through a social occasion without smoking? | <input type="radio"/> Yes | <input type="radio"/> No |
| 12. | Are you always able to stop smoking when you want to? | <input type="radio"/> Yes | <input type="radio"/> No |
| 13. | Do you think that if you decided to stop smoking again you would be successful at it? | <input type="radio"/> Yes | <input type="radio"/> No |
| 14. | Do you think you would get very tense and anxious if you stopped smoking? | <input type="radio"/> Yes | <input type="radio"/> No |

15. Do you take great care when planning trips, social events, etc., to allow for a time when you can smoke? ☐ Yes ☐ No
16. Do you have a cigarette when you first get up in the morning? ☐ Yes ☐ No

Appendix D – Coversheet and Checklist of Demographic and Asthma-Related Variables

Baseline data Code:

Date:

School: ☐ Intervention
☐ Control

☐ Days absent in 2005/2006 ☐ Days absent in 2006/2007

Monthly Salary: ☐ Father ☐ Mother ☐ Other income

English Total score: ☐ >50 ☐ 50-75 ☐ 75-100

Asthma Severity: ☐ Nil ☐ Mild
☐ Moderate ☐ Severe

Asthma medications: ☐ Ventolin ☐ Corticosteroids ☐ Nil

Other illnesses: ☐ Eczema ☐ Allergies, specify type
☐ Allergic Rhinitis ☐ Recurrent Chest Infection
☐ Other illnesses/Disabilities.....

Family History of asthma / Wheezing / SOB: ☐ Father ☐ Mother
☐ Siblings ☐ None

Family Asthma Severity ☐ Nil ☐ Mild
☐ Moderate ☐ Severe

Thank you for taking time completing the following questions. Please respond to each of the following questions as indicated below. Please ensure that you only have one answer to any question. If you are unsure about any question, please take the time to read it again and circle the answer that best describe you or your status. Please notice that all the data will be treated confidentially and will be kept in a safe place. All data results will be used as part of my Doctoral work. You will be notified if any publications arise from the data that you provided. Thank you again.

Date:

1) ☐ Male ☐ Female Date of Birth:

2) School Name: ☐ ☐
☐ ☐
☐ ☐

3) Do you smoke? ☐ Everyday ☐ Three times a week
☐ Does not smoke (Ex-smoker) ☐ Never smoked before

4) Who Smokes in your family? ☐ Mother ☐ Father
☐ Siblings ☐ Nil

5) Does he/she smoke? ☐ regularly ☐ Heavily
☐ Rarely ☐ occasionally

6) Do you have pets in house? ☐ Yes ☐ No

Appendix E – Letter to the Principal in Pilot Study

Date: 24/8/2006

Nihaya Al-sheyab

PhD Candidate

University of Technology, Sydney

Dear Mrs. Alahmad,

I would like to offer your school an opportunity to participate in a study examining the effects of a peer-led asthma education program called the Adolescent Asthma Action (the Triple A program), which will start in early October this year. This study has been accepted by the Ethics committee in both the Ministry of education in Jordan and university of Technology, Sydney in Australia.

This program involves volunteer students from year 11 training in asthma education and smoking prevention and then running three interactive asthma education sessions for year 10 students. Groups of year 10 students will transform what they have learnt in the asthma sessions into brief asthma key messages to present to their peers and school population during a one hour assembly. The Triple A program aims to improve quality of life, asthma knowledge and awareness, and self-efficacy to resist smoking.

This program will be implemented in some high schools in northern Jordan in December this year. I am offering the program to your school because asthma is under-diagnosed and under-treated in Northern Jordan especially among our children and adolescents. In addition, smoking prevalence is very high among adolescents in Jordan.

I would like to arrange a meeting with you or a school representative to discuss the program in greater detail. I have a video presentation that explains the Triple A program and how it works. I can be contacted on [redacted] if you have any questions regarding this program or the study, or you can kindly contact my assistant; Mr. Radi on [redacted].

Yours Sincerely,

Nihaya Al-sheyab

Appendix F – Teachers' Pamphlet in Pilot

Why is it important to learn about ASTHMA?

- ❑ Because ASTHMA affects our breathing.
- ❑ Without air we only have minutes to live.
- ❑ The prevalence of asthma is increasing noticeably worldwide, especially in adolescents & children).
- ❑ Asthma affects the whole school community

What is ASTHMA?

- ❑ A person with asthma has sensitive airways in the lungs.
- ❑ Airways narrow when irritated due to:
 1. Swelling of the lining of the airways
 2. Excess mucous production
 3. Tightening of the muscles around the airways

What are the signs of ASTHMA?

1. Breathing harder (wheezing & coughing)
2. Difficulty in speaking during an attack
3. Being tired/sleepy
4. Breathlessness with exercise
5. Chest tightness

What are the triggers of ASTHMA?

A trigger is a substance or condition, which brings on an asthma attack in a person with asthma. A child with asthma might be sensitive to only one or more of the following triggers:

1. Allergens (pollens, animals, dust mites, food, drinks)
2. Chemicals (additives, medications,
3. Irritants (Tobacco smoke, cleaners & paints, perfumed products)
4. Environmental factors (sudden weather changes, cold air)
5. Infections (Colds & Flu)
6. Exercise (Exercise-induced asthma)
7. Emotions (anger, fear, laughter)

How is ASTHMA treated?

Asthma can't be cured, but it can be treated & controlled. Some people with asthma need hospitalization when having a severe attack. Treatment with medications depends

on asthma severity and symptoms' frequency. There are two common types of medications:

1. **Preventors**: make the airways less sensitive, reduce swelling and mucous production in the airways. It should be taken every day, even when feeling well. An example is oral steroids (Prednisone).
2. **Relievers**: ease asthma symptoms in an attack to relax the muscles around the airways. An example is bronchodilators (Ventolin).

Proper asthma education about its management is the key to control asthma symptoms. This can be done best by peer education in high-school students.

What is the Triple A (Adolescent Asthma Action) program?

- Is the first peer-led asthma health education program where senior students educate other students about asthma and promoting a culture where it is "cool" to be a non-smoker.
- Entrusts young people with responsibility of passing on important health information and promoting positive health behaviour.
- Is fun, exciting, & simple, using videos, dance, songs, games & group discussions to enhance learning.
- Has little impact on teachers' time.

How does the Triple A program work in schools?

It is implemented in a 3-step process:

Step 1 (Asthma Peer Leaders (APL) training workshop)

Step 2 (3 asthma peer-led lessons by APL to year 10 students)

Step 3 (year 10 asthma performance presentation to students, parents, & staff)

What is the ripple effect of the Triple A program?

Triple A educators → Asthma Peer Leaders → year 10 students → school population

How do the students with asthma benefit?

1. Improves quality of life
2. Decrease asthma-related school absenteeism
3. Reduce asthma attacks in schools
4. Leads to positive attitudes
5. Increase knowledge & confidence about asthma & its management.

How does the school community benefit?

1. Increases knowledge & confidence about asthma & its management
2. Reduces class disruptions due to asthma-related absences
3. Improves participation of students in physical activities
4. Improves acceptance of students with chronic disease
5. Creates a positive culture in which it is cool to be a non-smoker
6. Enhance group & leadership skills in participating students
7. Helps build friendships & relationships

Why do teachers and community should support the Triple A program?

Because they are role models whom adolescents respect and inspire their behaviours from. And, it is an opportunity for teachers to increase their knowledge about asthma and its management, thus decreasing any panic situation when a student is having an attack in the school!

Finally: always remember the old Chinese proverb:

Tell me and I will forget,

Show me and I will understand

Involve me and I will remember!!!!!!!!!!!!!!

Appendix G – Information Sheet

a) Parent/Guardian Information Sheet for Pilot Study

Dear Parents/Guardians:

Your child is invited to participate in a study that helps young people with asthma or wheezing to understand and manage their asthma and wheezing effectively. The program uses older students to help younger children understand and manage their wheezing and asthma so they have better quality of life, asthma and wheezing management, knowledge and awareness, resistance to cigarette smoking, and reduced school absences due to asthma or wheezing. The program is called Adolescent Asthma Action (Triple A) Program and the high school your child attends has been selected and approved for the study. The Triple A Program has been shown to improve asthma and wheezing management in Australians including migrants from the Middle East including Jordan.

The program involves three steps in this school semester.

- If your child is in year 11 and volunteered to participate in this study, he/she will be trained by myself and two other trained research nurses to be leaders in a six hours workshop on a Saturday. Following this, your child will be asked to run a three short (45 minute) health lessons about asthma management and smoking for year 10 students during school time. Your child will be given the program's manual to use in these health lessons.
- If your child is in year 10, he/she will receive three 45- minute asthma health lessons about asthma, its management, medications, triggers, and smoking from the trained year 11 students in fun and simple ways such as games, group discussions and role-plays. A volunteer schoolteacher will be in these lessons to provide minimal supervision to ensure appropriate student behaviours. Following the three lessons, your child will be working in groups with other students to prepare and present the asthma information for the whole school community in a special assembly of one hour.
- If your child is in year 8 or year 7, he/she will be attending the special assembly of one hour about asthma and smoking by year 10 students.
- The whole school community including parents like yourself will be invited to attend this special assembly so that you may also learn about asthma and wheezing and its management.

- All children will be asked to complete three questionnaires about their quality of life, knowledge of asthma and wheezing, school absence and ability to resist smoking pressure. These questionnaires will take about 20 minutes to complete on two occasions (November 2006 and March 2007) and will be completed during school time.

You and your child may be asked to participate in group discussions to assist in modifying the Triple A program and its resources according to you and your child's needs, knowledge, and experiences of asthma. Each discussion will take about 60 to 90 minutes and will be running in a school hall/venue in a school period (date and time is negotiated). Your child was selected as a possible participant in this study because he/she in year 11 or in year 7, 8, or 10 classes with asthma and/or recent wheeze, and is attending regular school classes.

All information collected during the study will be confidential. Your child's name will not be used on any of the questionnaires. School staff will not see the results. And your child may withdraw at any time he/she chooses without giving any reason.

There are no major risks to your child as a participant in this study and the minimal risk of inappropriate student behaviour during the program will be managed by supervision by teachers and researchers.

Your decision whether or not agree to let your child participating in this study will not make any difference to his/her circumstance and or grades as student in the school. You will be given a copy of this form to keep. My name is Nihaya Al-sheyab, and I am currently doing my Doctor of Philosophy (PhD) degree in Nursing at the University of Technology, Sydney (UTS) in Australia. I have been working as a Clinical Trainer and a Teacher Assistant in the faculty of Nursing at Jordan University of Science and Technology (JUST) from September 1999 until July 2003. I currently hold a scholarship from JUST to complete my PhD degree in nursing. This study is a requirement for the degree I am currently studying for. My work is closely supervised by Associate Professor Robyn Gallagher, Professor Jackie Crisp and Dr. Smita Shah.

If you have any questions please contact me on 02 7071134 or my assistant (Mr Radi Gharaibeh) on 02 7071220. For more information about the study, please contact your child's school or the Director of research unit at the ministry of education in Jordan Mr. Ahmad Saleh on +962 6 5431 2660.

NOTE: This study has been approved by the University of Technology, Sydney Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research which you cannot resolve with the researcher, you may contact the Ethics Committee through the Research Ethics Officer (ph: +61 2 9514 9615 Research.Ethics@uts.edu.au). Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

b) Parent/Guardian Information Sheet for Control Schools

Dear Parents/Guardians:

Your child is invited to participate in a study that helps young people with asthma or wheezing to understand and manage their asthma and wheezing effectively. The program uses older students to help younger children understand and manage their wheezing and asthma so they have better quality of life, asthma and wheezing management, knowledge and awareness, resistance to cigarette smoking, and reduced school absences due to asthma or wheezing. The program is called Adolescent Asthma Action (Triple A) Program and the high school your child attends has been selected and approved for the study. The Triple A Program has been shown to improve asthma and wheezing management in Australians including migrants from the Middle East including Jordan.

Your child's school will not implement the Triple A program and he/she will still receive the usual care in case of emergency due to asthma or wheezing in the school. However, during the implementation process of the Triple A program in other high schools, I would like your child to complete three questionnaires about their quality of life, knowledge of asthma and wheezing, school absence and ability to resist smoking pressure. These questionnaires will take about 20 minutes to complete on two occasions (November 2006 and March 2007) and will be completed during school time.

The reason for completing these questionnaires is to compare the results of children with asthma or wheezing, who do not receive the Triple A program with other students who received the program.

All information collected during the study will be confidential. Your child's name will not be used on any of the questionnaires. School staff will not see the results. And your child may withdraw at any time he/she chooses without giving any reason.

There are no major risks to your child as a participant in this study and the minimal risk of inappropriate student behaviour during the program will be managed by supervision by teachers and researchers.

Your decision whether or not agree to let your child participating in this study will not make any difference to his/her circumstance and or grades as student in the school. You will be given a copy of this form to keep. My name is Nihaya Al-sheyab, and I am currently doing my Doctor of Philosophy (PhD) degree in Nursing at the University of Technology, Sydney (UTS) in Australia. I have been working as a Clinical Trainer and a Teacher Assistant in the faculty of Nursing at Jordan University of Science and Technology (JUST) from September 1999 until July 2003. I currently hold a scholarship from JUST to complete my PhD degree in nursing. This study is a requirement for the degree I am currently studying for. My work is closely supervised by Associate Professor Robyn Gallagher, Professor Jackie Crisp and Dr. Smita Shah.

If you have any questions please contact me on [redacted] or my assistant (Mr Radi Gharaibeh) on [redacted]. For more information about the study, please contact your child's school or the Director of research unit at the ministry of education in Jordan Mr. Ahmad Saleh on +962 6 5431 2660.

NOTE: This study has been approved by the University of Technology, Sydney Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research which you cannot resolve with the researcher, you may contact the Ethics Committee through the Research Ethics Officer (ph: +61 2 9514 9615 Research.Ethics@uts.edu.au). Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

c) Parent/Guardian Information Sheet for Intervention Schools

Dear Parents/Guardians:

Your child is invited to participate in a study that helps young people with asthma or wheezing to understand and manage their asthma and wheezing effectively. The program uses older students to help younger children understand and manage their wheezing and asthma so they have better quality of life, asthma and wheezing management, knowledge and awareness, resistance to cigarette smoking, and reduced school absences due to asthma or wheezing. The program is called Adolescent Asthma Action (Triple A) Program and the high school your child attends has been selected and approved for the study. The Triple A Program has been shown to improve asthma and wheezing management in Australians including migrants from the Middle East including Jordan.

The program involves three steps in this school semester.

- If your child is in year 11 and volunteered to participate in this study, he/she will be trained by myself and two other trained research nurses to be leaders in a six hours workshop on a Saturday. Following this, your child will be asked to run a three short (45 minute) health lessons about asthma management and smoking for year 10 students during school time. Your child will be given the program's manual to use in these health lessons.
- If your child is in year 10, he/she will receive three 45- minute asthma health lessons about asthma, its management, medications, triggers, and smoking from the trained year 11 students in fun and simple ways such as games, group discussions and role-plays. A volunteer schoolteacher will be in these lessons to provide minimal supervision to ensure appropriate student behaviours. Following the three lessons, your child will be working in groups with other students to prepare and present the asthma information for the whole school community in a special assembly of one hour.

- If your child is in year 8 or year 7, he/she will be attending the special assembly of one hour about asthma and smoking by year 10 students.
- The whole school community including parents like yourself will be invited to attend this special assembly so that you may also learn about asthma and wheezing and their management.
- All children will be asked to complete three questionnaires about their quality of life, knowledge of asthma and wheezing, school absence and ability to resist smoking pressure. These questionnaires will take about 20 minutes to complete on two occasions (November 2006 and March 2007) and will be completed during school time.

All information collected during the study will be confidential. Your child's name will not be used on any of the questionnaires. School staff will not see the results. Also, your child may withdraw at any time he/she chooses without giving any reason.

There are no major risks to your child as a participant in this study and the minimal risk of inappropriate student behaviour during the program will be managed by supervision by teachers and researchers.

Your decision whether or not agree to let your child participating in this study will not make any difference to his/her circumstance and or grades as student in the school. You will be given a copy of this form to keep.

My name is Nihaya Al-sheyab, and I am currently doing my Doctor of Philosophy (PhD) degree in Nursing at the University of Technology, Sydney (UTS) in Australia. I have been working as a Clinical Trainer and a Teacher Assistant in the faculty of Nursing at Jordan University of Science and Technology (JUST) from September 1999 until July 2003. I currently hold a scholarship from JUST to complete my PhD degree in nursing. This study is a requirement for the degree I am currently studying for. My work is closely supervised by Associate Professor Robyn Gallagher, Professor Jackie Crisp and Dr. Smita Shah.

If you have any questions please contact me on _____ or my assistant (Mr Radi Gharaibeh) on _____. For more information about the study, please contact your child's school or the Director of research unit at the ministry of education in Jordan Mr. Ahmad Saleh on +962 6 5431 2660.

NOTE: This study has been approved by the University of Technology, Sydney Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research which you cannot resolve with the researcher, you may contact the Ethics Committee through the Research Ethics Officer (ph: +61 2 9514 9615 Research.Ethics@uts.edu.au). Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

Appendix H – Consent Form

Parent/Guardian Consent Form

1. I,.....agree/do not agree my child
..... in year.....in.....school
participate in the study described in the participant information statement attached to this form.
2. I acknowledge that I have read the participant information statement, which explains why my child has been selected, the aims of the study and the nature and the possible risks of the investigation, and the statement has been explained to me to my satisfaction.
3. Before signing this consent form, I have been given the opportunity of asking any questions relating to any possible physical and mental harm my child might suffer as a result of his/her participation and I have received satisfactory answers by Mrs Nihaya Al-sheyab.
4. I understand that my child can withdraw from the study at any time without prejudice to him/her. I do not have to give reasons for my decision to withdraw. I agree that research data gathered from the results of the study may be published, provided that I cannot be identified.
5. I understand that my child may miss some class time as a result of his/her participation such as sport or Art lessons. This will be negotiated with school teachers.
6. I understand that if I have any questions relating to my child's participation in this research, I may contact Mrs. Nihaya Al-sheyab on or:

The Director of research unit at Ministry of Education at Jordan, Mr. Ahmad Saleh on +962 6 5431 2660 or:

Faculty of Nursing, Midwifery and Health University of Technology, Sydney:

Associate Professor Robyn Gallagher, on +61 2 9514 5746
7. I acknowledge receipt of a copy of this Consent Form and the Participant Information Statement.

Complaints may be directed to the Human Research Ethics Committee University of Technology Sydney.

_____/_____/_____
Signature (Caregiver/Student) Date

_____/_____/_____
Signature (Witness) Date

NOTE: This study has been approved by the University of Technology, Sydney Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research which you cannot resolve with the researcher, you may contact the Ethics Committee through the Research Ethics Officer (ph: +61 2 9514 9615 Research.Ethics@uts.edu.au). Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

Appendix I – Amendment Approval from UTS Regarding Consent Process

18 April 2007

Associate Professor Robyn Gallagher
CB10.07.214
Faculty of Nursing, Midwifery and Health
University of Technology

Dear Robyn,

UTS HREC 2006- 214 - GALLAGHER, Associate Professor Robyn, CRISP, Professor Jackie (for AL-SHEYAB, Ms Nihaya PhD student) – “Evaluation of the impact of a peer-led health education approach on health outcomes of asthmatic students and on cigarette smoking among high school students in Northern Jordan”

At its meeting held on 10 April 2007, the UTS Human Research Ethics Committee considered and approved your request to obtain signed consent from students whose parents had approved joining the study.

If you wish to make any further changes to your research, please contact the Research Ethics Officer in the Research and Innovation Office, Ms Hadiza Yunusa on 02 9514 9615.

In the meantime I take this opportunity to wish you well with the remainder of your research.

Yours sincerely,

Professor Jane Stein-Parbury
Chairperson,
UTS Human Research Ethics Committee

Appendix J – Evaluation Form for the Asthma Peer Leaders Workshop

Age: _____

Date: _____

What are the three important things that you gained from the training workshop?

What did you like in particular?

What can be improved?

Appendix K – Evaluation Form for the Year 10 Asthma Lessons

Age: _____

Date: _____

What are the three important things that you gained from the asthma lessons?

What did you like in particular?

What can be improved?

Appendix L – Results of the Intervention Phase of the Pilot Illustrated in Figures

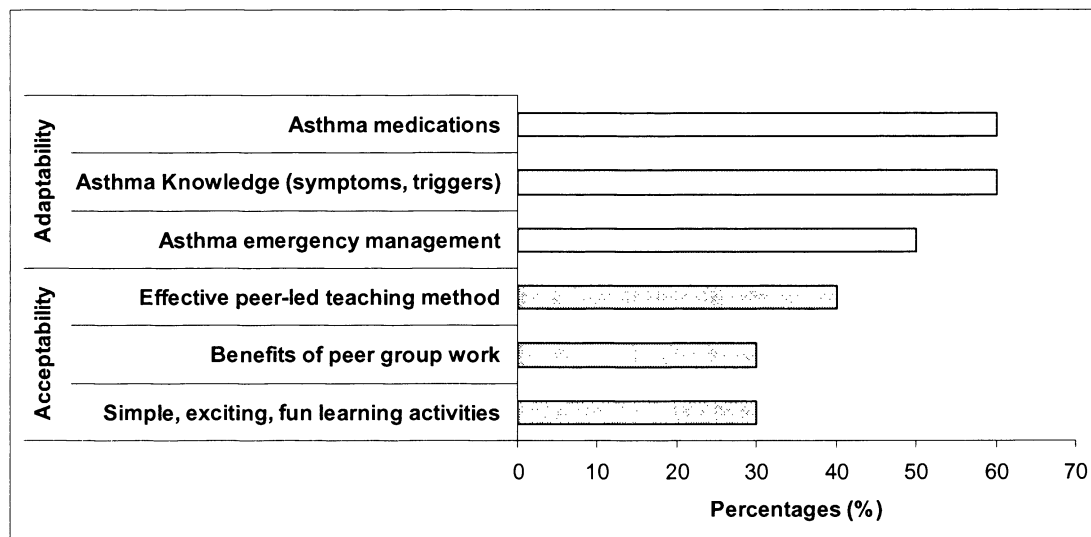


Figure 9 Learning outcomes from the APLs training workshop in Jordan

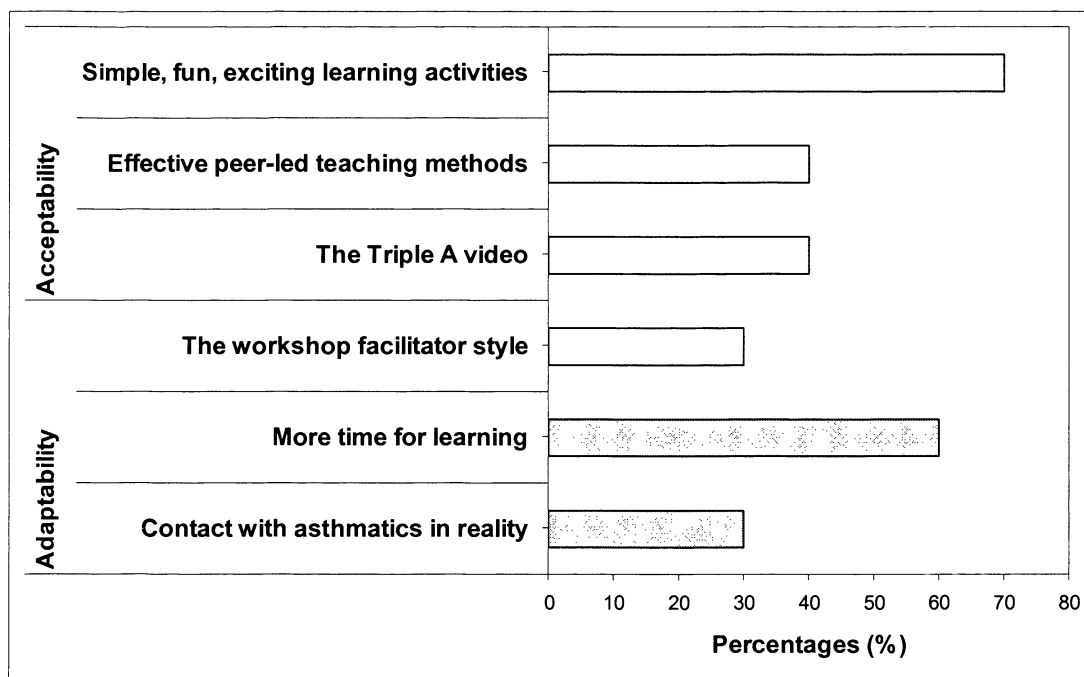


Figure 10 Preferences and suggestions for the APLs training workshop in Jordan

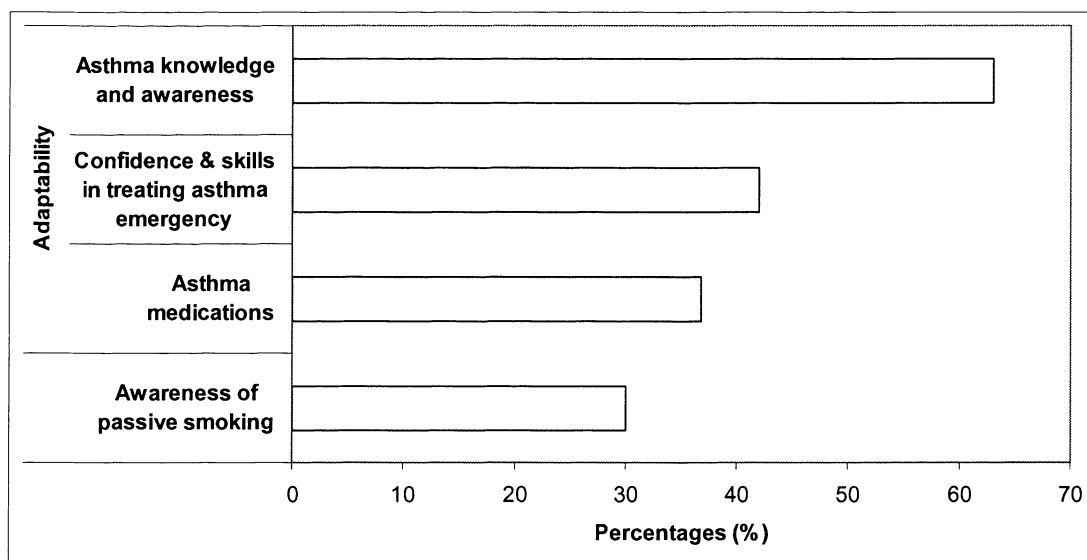


Figure 11 Learning outcomes by year 10 students of APLs Asthma lessons in Jordan

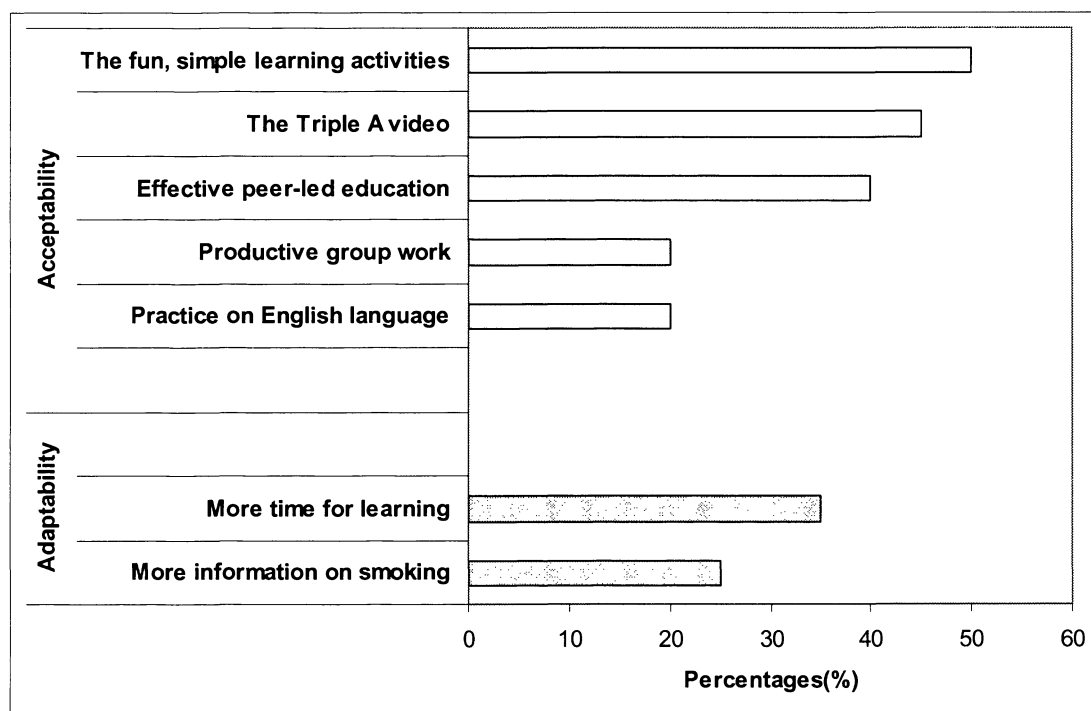


Figure 12 Preferences and suggestions by year 10 students for APLs Asthma lessons in Jordan

Appendix M – Key Questions for the Peer Focus Group

- *What does the word "peer" mean to you?*
- *Do you think peer-led programs like the Triple A program can be successful in effectively managing asthma attacks in schools and home?*
- *What are the aspects of the Triple A program that you think needs modification to suit Jordanian adolescents?*
- *What did you like and dislike in the three steps of implementing the Triple A program?*
- *What did you gain as a student from participating in the Triple A program?*
- *Would you like to add any thing that you feel it is important to address for successful adaptation of the Triple A program?*

Appendix N – Key Questions for the Asthma Focus Group

- *What do the words "asthma", "wheezing" mean to you?*
- *How do you feel about being asthmatic, having asthma symptoms, or being a parent of asthmatic children?*
- *What are the barriers you face in the school environment or at home that prevent you from effective asthma management?*
- *What do you need from the school or your local community as an asthmatic or as a parent of asthmatic children?*
- *Tell me what do you know about asthma triggers, asthma medications, and management plan?*
- *Tell me what do your parents and friends think of your asthma symptoms?*
- *If you have experienced an asthma attack at school, can you tell me how you felt, and what was the action provided by your school?*
- *Do you think the Triple A program could be effective in managing your asthma if adopted by your school?*
- *What modifications do you think should be made to the survey questionnaires to make them more understandable to students?*
- *Do you have anything else you would like to add at all?*