FACTORS THAT AFFECT ADOLESCENTS’ ADHERENCE TO DIABETES TREATMENT

Laura Cox and Jane Hunt identify individual and combinations of factors, such as parental and peer attitudes, that influence the extent to which young people adhere to medication regimens.

Abstract
There is strong evidence suggesting young people with type 1 diabetes experience difficulties adhering to their treatment regimens. The purpose of this literature review is to identify reasons for a lack of compliance in adolescents to allow nurses to develop knowledge to help improve treatment adherence. A literature search was undertaken by searching databases using key terms and inclusion criteria identified. The three themes are: parental influence, peer influence and depression. Findings indicate parental influence may be the main contributing factor towards non-compliance; however, associations between themes imply non-compliance is a result of a combination of factors. Limitations have been highlighted from the articles reviewed and provide opportunity for future research.

Keywords
Adolescence, diabetes mellitus, compliance, medication regimen, teenagers, type 1 diabetes

TYPE 1 DIABETES (T1D) is a lifelong condition that is usually diagnosed in childhood (Diabetes UK 2014). In the United Kingdom (UK) there are about 33,600 people under the age of 19 with the condition. For those with T1D, life expectancy is reduced, on average, by ten years; it is the fifth commonest cause of death worldwide (Diabetes UK 2014).

Adolescence is a stage of physiological and psychological development between ten to 18 years of age (World Health Organization 2013), which is considered challenging (Cooper and Geyer 2007). For those with T1D, adolescence is the most likely phase where glycaemic control deteriorates due to non-compliance with treatment (Helgeson et al 2008). The national paediatric diabetes audit (National Paediatric Diabetes Project Board and Royal College of Paediatrics and Child Health 2012) defines compliance as the extent to which medical advice is followed to achieve therapeutic goals, but the audit reveals that only 16% of adolescent males and 15% of adolescent females comply with T1D treatment.

Maintaining glycaemic control is important to prevent short-term complications such as hypoglycaemia, hyperglycaemia and diabetic ketoacidosis (Shaw and Cummings 2012). Long-term complications of uncontrolled diabetes can result in cardiovascular disease, renal disease, diabetic retinopathy and neuropathies (Shaw and Cummings 2012). Multiple health complications arise in one fifth of adults with T1D due to inadequately managed diabetes in younger years (Dabadghao et al 2001). Therefore, compliance with treatment in adolescence is essential to reduce complications later in life (Dabadghao et al 2001).

As non-compliance with T1D treatment occurs primarily during adolescence and because of the significant health complications resulting from
uncontrolled diabetes (Cooper and Geyer 2007), a literature review was undertaken to identify reasons for this behaviour. Establishing factors for adolescent non-compliance may enable nurses to understand their reasoning and work with young patients to reduce non-compliant behaviours.

Method
A literature search allowed for identification and review of primary research concerning non-compliance with treatment in adolescents with T1D. Literature was sourced from the MEDLINE, the Cumulative Index to Nursing and Allied Health Literature, Science Citation Index, National Library of Medicine and Science Direct. Further relevant papers were accessed through reference lists, ensuring that articles were full text and peer reviewed to attain high quality results (Whittaker and Williamson 2011). An advanced search engine and Boolean phrase technique were used, with operators ‘AND’ and ‘NOT’ (Whittaker and Williamson 2011) to ensure retrieval of results containing key terms. More than 200 papers were found and, after careful review, 12 were deemed usable based on their relevance, and inclusion and exclusion criteria. Inclusion criteria were:

- Adolescents aged ten to 18 years.
- Primary research published from 2006 to 2013 to ensure currency.
- Papers written in English undertaken in the UK and the United States (US) to minimise cultural differences.

Initially, the aim had been to review studies from the UK. However, the dearth of articles retrieved meant that inclusion criteria were widened to include studies from the US, where extensive primary research into this topic has been conducted. From the final articles selected, three key themes were identified.

Themes
Parental influence This issue has been examined in relation to compliance with T1D treatment through studying parent-adolescent relationships (Helgeson et al 2008, Drew et al 2010). In a survey, Drew et al (2010) questioned 252 male and female participants aged ten to 16 years and found that good-quality relationships between parents and adolescents were associated with improved compliance, compared with poor-quality relationships. Adolescents also improved T1D treatment adherence when perceiving parents as encouraging rather than discouraging of independence (Drew et al 2010).

Further, a four-year longitudinal study of 132 male and female adolescents found that parent-child relationships affected metabolic control and compliance (Helgeson et al 2008). Here, healthier adolescent-parent relationships were related to less metabolic deterioration and improved compliance with T1D-related tasks compared with less favourable relationships. Parent-child relationships also have a stronger influence on compliance in female adolescents compared with their male counterparts (Helgeson et al 2008).

Parental influence in T1D compliance has also been studied through assessing parenting styles (Greene et al 2010, Mlynarczyk 2013). A cross-sectional survey involving 102 young people, aged 12 to 18 years, illustrates how adolescents who perceive their parents as authoritative have better T1D treatment adherence compared with young people who perceive their parents as authoritarian, permissive or neglectful (Mlynarczyk 2013).

Other research based on structured interviews with 81 male and female young people at two time periods 12 months apart concluded that responsive, supportive and emotionally warming parents – a characteristic of authoritative parenting – promoted T1D quality of life and compliance with treatment (Botello-Harbaum et al 2008). Further work by Greene et al (2010) that involved giving 29 male and female adolescents and their parents self-report questionnaires found that compliance was associated with authoritative parenting, more so in mothers than fathers.

Peer influence This factor similarly contributes to non-compliance in adolescents with T1D through thoughts, conflict and agreement in friendships, and the need for peer acceptance (Hains et al 2007, Burke and Dowling 2007, Helgeson et al 2009, Drew et al 2010). Hains et al (2007) quantitatively studied peer reactions to T1D management through structured questionnaires with 102 ten to 18 year olds. They found that adolescents with negative thoughts about peers’ reactions were less likely to comply with T1D treatment in social situations.

Hains et al (2007) also studied peer influences and compliance with T1D treatment. They identified that individuals who experienced diabetes-related stress received greater support from friends, but this did not significantly improve treatment compliance.

Helgeson et al (2009) used self-report questionnaires to study positive and negative aspects of friendships in relation to self-care behaviours in 76 participants aged 13 to 16, but obtained little evidence to link peer support with compliance. However, Helgeson et al (2009) did find that conflict among peers was associated with poorer adherence with treatment in female
adolescents. In contrast, another study involving interviews with five adolescents established that support and understanding from friends helped adolescents with T1D to manage their care and adhere to treatment (Burke and Dowling 2007).

Peer influence has also been studied through peer orientation, which refers to the extent to which adolescents sacrifice positive development for acceptance (Drew et al 2010). Extreme peer orientation was studied by Drew et al (2010), who established that adolescents oriented to peers with poor parent relationships were likely to put themselves at risk of poor diabetes management through non-compliance with T1D tasks and treatments. Equally, Burke and Dowling (2007) qualitatively highlighted the effect that peers have on adherence by finding adolescents are tempted to rebel against T1D health regimens if their friends are domineering.

**Depression** By exploring reasons for non-compliance, Helgeson et al (2008) found that, over a four-year period, depressive symptoms in adolescents with T1D were predictors of poor compliance. Similarly McGrady et al (2009) sought to determine associations between non-compliance and depressive symptoms in 276 adolescents, using self-report questionnaires. They found that reduced blood glucose monitoring and low insulin administration was associated with depressive symptoms, leading them to conclude that adolescents with T1D with increased depressive symptoms experience difficulties in initiating and carrying out treatment-related tasks compared with adolescents with few depressive symptoms.

Hughes et al (2012) aimed to establish whether emotional processing and self-control predicted adherence in adolescents with T1D by using self-report questionnaires. Findings from 137 male and female adolescents suggested that those with low emotional processing (a sign of depression), combined with low self-control, do not comply with treatment and are at high risk of poor diabetes outcomes compared with those who have high emotional processing and good self-control. Additionally, the interaction of emotional processing and self-control in diabetes care predicted self-efficacy and adherence, signifying the importance of these factors in health outcomes for adolescents with T1D (Hughes et al 2012).

Korbel et al (2007) recruited 127 adolescents with T1D to establish whether gender differences and depression affect compliance with treatment and, consistent with previous findings, found depression to be a predictor of poor compliance with T1D tasks. In addition, females reported higher levels of depressive symptoms, suggesting that depression in adolescent females contributes to poorer compliance with T1D treatment compared with males (Korbel et al 2007). The conclusions of Hood et al’s (2006) work were similar. Their study used self-report questionnaires to investigate depression in 145 males and females aged ten to 18; they found that adolescents with T1D exhibiting depressive symptoms were predominately female and monitored their blood glucose levels less frequently, showing signs of poor compliance.

**Discussion**

Adolescence is a phase of development considered challenging and can lead to experimental behaviours, which test boundaries (Burke and Dowling 2007, Cooper and Geyer 2007). Such behaviours in adolescents with T1D can inadvertently lead to later health complications due to the likelihood of non-compliance with treatment (Dabadghao et al 2001, Helgeson et al 2008). This literature review sought to determine reasons for treatment non-compliance in adolescents with T1D and found that parental influence, peer influence and depression were influential.

**Parental influence** The most common theme identified across the research was parental influence, with the implication that this is the most significant factor contributing to treatment non-compliance (Botello-Harbaum et al 2008, Mlynarczyk 2013). Research into parental influence was undertaken by studying parent-child relationships or by assessing parenting styles (Helgeson et al 2008, Botello-Harbaum et al 2008, Drew et al 2010, Greene et al 2010, Mlynarczyk 2013). Healthy relationships, in which parents were encouraging towards their child, resulted in improved compliance compared with poorer parent-child relationships (Helgeson et al 2008, Drew et al 2010). Through playing a significant role in their children’s T1D management, parents in healthy parent-child relationships can support and reinforce behaviours, resulting in enhanced treatment compliance (Mlynarczyk 2013).

Additionally, authoritative parenting styles lead to improved compliance (Greene et al 2010) compared with authoritarian, permissive or neglectful parenting styles (Mlynarczyk 2013). Authoritarian or permissive parents are described as demanding and not responsive or responsive and not demanding.

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whereas authoritative parents are responsive and assertive (McAuley et al 2006).

Authoritative parenting increases compliance because parents are likely to engage in behaviours that promote adolescent self-care and independence (Greene et al 2010, Mlynarczyk 2013). Greene et al (2010) suggested that this behaviour was more likely in mothers and found authoritative maternal parenting improved compliance more than authoritative paternal parenting (Greene et al 2010).

**Peer influence** The second theme identified indicates that peers negatively influence adolescents’ compliance with T1D treatment (Hains et al 2007, Helgeson et al 2009, Drew et al 2010). Negative influences reducing compliance have been studied through peer perceptions (Hains et al 2007), conflict in friendships (Helgeson et al 2009) and the need for acceptance (Drew et al 2010, Burke and Dowling 2007). Hains et al (2007) suggested that the source of non-compliance with T1D treatment in adolescents may arise from individuals’ feelings and beliefs about negative peer reactions. Negativity related to peer conflict and rejection also affects compliance, although further research is necessary to identify the extent to which these factors reduce compliance (Helgeson et al 2009, Drew et al 2010).

Supportive friendships have been found to have little effect on compliance, although previous findings appear inconsistent when determining whether peer support is beneficial for compliance (Hains et al 2007, Helgeson et al 2009). Peer support increased for adolescents experiencing stress (Haines et al 2007), yet little evidence was found to link compliance with peer support (Haines et al 2007, Helgeson et al 2009).

One qualitative study identified that peer support improved compliance with T1D treatment (Burke and Dowling 2007), but this qualitative research was based on a small sample size. Hence, findings of the review reported here are contradictory, with the consequence that sound conclusions cannot be drawn.

**Depression** This was the final theme identified in relation to adolescents’ compliance with T1D. Depression in this age group has been associated with negative health outcomes and poor adherence with T1D treatment (Hood et al 2006, Helgeson et al 2008, Korbel et al 2007, McGrady et al 2009, Hughes et al 2012). Literature indicates that one in seven adolescents with diabetes in the US meets depression criteria (Hood et al 2006), and all papers reviewed for this literature review indicate that depression reduces compliance.

It is thought that depression is likely in those with T1D because diabetes management is demanding and requires control over emotions and behaviour (Hughes et al 2012). The findings indicate the need to pay close attention to the emotional wellbeing of adolescents with T1D (Helgeson et al 2008).

An issue resulting from studies establishing associations between depression and non-compliance is whether depression causes non-compliance or non-compliance results in depression, meaning that the findings are bidirectional (Hood et al 2006, McGrady et al 2009), lacking internal validity due to the difficulties of establishing cause and effect (Jackson 2011). Hood et al (2006) and McGrady et al (2009) highlight this, while stressing the need for longitudinal research in a bid to establish cause. Helgeson et al (2008) linked depression with non-compliance in adolescents with T1D in a four-year longitudinal study, but failed to identify causality.

**Gender differences** Female and male adolescents were studied throughout the articles reviewed and several studies highlighted gender discrepancies. Helgeson et al (2009) showed that peer conflict was more likely to affect female T1D compliance, despite both genders reporting the same level of peer conflict, attributing this to differing processing mechanisms across genders.

Helgeson et al (2008) found that parent-child relationships had stronger influences on compliance rates in females compared with males. Finally, Korbel et al (2007) and Hood et al (2006) reported that females had higher levels of depressive symptoms, suggesting that depression in adolescent females is a greater contributory factor to poor compliance than it is in males. While this review did not focus on gender differences, it was evident that studies made gender distinctions, indicating that future reviews should explore gender and compliance.

**Interlinking the themes** Associations between themes have been highlighted in various ways. For example, Drew et al (2010) link peer and parental influence by suggesting that poor adolescent-parent relationships and extreme peer orientation results in non-compliance, whereas good adolescent-parent relationships and less peer orientation lead to better compliance.

Helgeson et al (2009) linked depression and peer influence, identifying that adolescents who experienced conflict in friendships had depressive symptoms and were unlikely to adhere to treatment. This suggests that reasons for non-compliance with treatment in adolescents with T1D may be intertwined, but associations between factors must...
be made clearer and studied in depth to identify how compliance can be improved.

**Limitations** Several limitations have been identified from the studies reviewed. Most used quantitative approaches, relying on self-report questionnaires, and it is apparent that a lack of qualitative findings since 2006 has produced few in-depth conclusions on the topic. Another limitation is that self-report methods lead to difficulties in establishing participant honesty (Jackson 2011). There is also the issue that maturity and understanding differ between ten to 18 years, so participants’ interpretations of questions may vary (Jackson 2011).

Finally, some quantitative studies used relatively small sample sizes and most findings are from the US. This makes it difficult to generalise findings to adolescents with T1D in the UK, resulting in a lack of external validity (Whittaker and Williamson 2011). Future qualitative UK-based research into non-compliance with treatment in adolescents with T1D would benefit to confirm US-based conclusions. Additionally, research should aim to identify gender differences in T1D treatment compliance, and longitudinal research may be appropriate to ascertain cause and effect and determine relationships between themes.

**Conclusion**

This literature review identified three main themes - parental influence, peer influence and depression - that affect rates of compliance with treatment in adolescents with T1D. Understanding these factors may enable nurses to reduce adolescent non-compliance and adverse health complications related to poor T1D management.

Most of the research explored centred on parental influence, suggesting that this is the main contributing factor to non-compliance. However, depression is so common in adolescence with T1D that causality must be established.

There is evidence that all the themes highlighted in this review are associated with reasons for non-compliance. The findings also suggest that females are at greater risk of non-compliance than males, although these relationships require further research to improve understanding. What is apparent is the need for more research to fully comprehend reasons for non-compliance with treatment in adolescents with T1D.