

Parent-adolescent Communication and Self-management of Type 1 diabetes.

A systematic literature review.

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Statement of Originality

This report contains no material offered for the award of any other degree or diploma, or material previously published, except where due reference is made in the text.

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Abstract

Aim: To present a synthesis of findings from empirical studies over the past 12 years regarding communication and interactions between parents and their adolescents' self-management of type 1 diabetes. *Background:* Communication between parent and adolescent is crucial, as diabetes responsibility shifts from parent to adolescent. Earlier research found parental support, conflict, control, and warmth to be important factors. Since then, emerging technologies such as online health interventions, mobile communication, and insulin pump technologies likely further influence parent-adolescent communication. *Methods:* PRIMSA guidelines were followed. Searches included, Pubmed, CINAHL, PsychINFO and Health source: Nursing/Academic edition between 1 January 2006 and 28 May 2018. Reference lists and citations of eligible articles was also searched. Included studies were peer-reviewed, in English, and featured communication between parents and their adolescents with type 1 diabetes. *Results:* Forty-one articles were eligible, including thirty-seven quantitative and four qualitative studies. Self-management was measured by adherence, glycemic control, diabetes self-efficacy, and self-care. Studies were synthesis within four main categories. Warmth and conflict yielded the most findings, followed by support, then control. Warmth and support was associated with adaptive communication for self-management, conflict was associated with maladaptive outcomes, and control was associated with both. The extent and strength of findings were discussed and related to an adapted theoretical model. *Conclusion:* Overall, a better understanding about the complexities of parent-adolescent communication may inform the development of effective interventions to improve diabetes self-care and glycaemic control among adolescents with type 1 diabetes. *Key words:* adolescent, parent-adolescent communication, type 1 diabetes, self-management.

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Chapter 1: Introduction

1.1 Introduction

Globally in 2017, over 1.11 million children were living with type 1 diabetes (International Diabetes Federation, 2018), and over 2,500 people are diagnosed in Australia each year (Australian Institute of Health and Welfare [AIHW], 2018). Type 1 diabetes (T1D) is a life-long autoimmune disease that is most commonly diagnosed in childhood and adolescence (AIHW, 2018). Currently T1D cannot be prevented or cured, and all people diagnosed require insulin to survive. Australia has the 12th-highest childhood incidence in the world (JDRF Australia, 2018), with an estimated seven new cases per day among children and adolescents (AIHW, 2018). Youth diagnosed with T1D are required to adopt a rigorous medical routine that involves monitoring blood glucose levels, regulating diet and physical activity, and multiple insulin injections daily or the use of an insulin pump (AIHW, 2018). Adherence to diabetes self-management is essential to avoid serious micro- and macro-vascular health complications. Maintaining the recommended glycosylated haemoglobin A_{1c} (HbA_{1c}) level of $\leq 7.0\%$ is significantly related to a reduced risk of health complications (Diabetes Australia, 2018). However, the majority (73%) of adolescents with T1D in Australia remain poorly controlled (i.e., within an HbA_{1c} level $> 8\%$) which suggests that more effective self-management support is needed (Phelan et al., 2017). HbA_{1c} level is an indication of self-management behaviour over the preceding 2 to 3 months (Diabetes Australia, 2018). Considering the prevalence of uncontrolled T1D among Australian adolescents, and the serious health implications, parent-adolescent communication to improve self-management and associated health outcomes is an important issue.

1.2 Type 1 Diabetes

T1D is one of the most common chronic childhood health conditions in Australia. The condition develops when the immune system destroys insulin-producing cells of the pancreas

(Diabetes Australia, 2018). Health risks are related to fluctuations of blood glucose levels, which can lead to hypoglycaemia (i.e., low blood sugar); hyperglycaemia (i.e., high blood sugar); and diabetic ketoacidosis (DKA), a life-threatening event from insufficient insulin (JDRF Australia, 2018). In Australia, 3,245 youths with T1D were hospitalised (year 2014-5) due to DKA events (AIHW, 2016). Long-term complications include eye disease (e.g., diabetic retinopathy), nerve damage (e.g., diabetic neuropathy), kidney disease (e.g., diabetic nephropathy), and heart disease or stroke (e.g., cardiovascular disease). Non-adherence is evident through diabetes complications resulting in blindness, leg amputations, and diabetes foot ulcers, and kidney and pancreas transplants (Diabetes Australia, 2018). T1D poses a substantial economic burden on the Australian health care system with estimated associated costs in excess of \$570 million (JDRF Australia, 2018). In 2015, T1D accounted for 59,900 hospitalisations in Australia, with the highest incidence among those aged 10-19 years (JDRF Australia, 2018). Whilst the statistics are concerning, the risk of diabetes-related complications can be greatly reduced with strict glycaemic control (JDRF Australia, 2018). However, T1D in adolescence is difficult to manage due to variable rates of growth and development, and hormonal changes during puberty, placing this population at higher risk for complications (Type 1 Diabetes Network [T1DN], 2018). Optimal parent-adolescent communication may improve self-management outcomes (i.e., glycaemic control and adherence) and reduce the incidence of diabetes complications (Phelan et al., 2017).

1.3 Self-Management outcomes

Glycaemic control describes the maintenance of blood glucose levels over time (Diabetes Australia, 2018). Evidence suggests that long-term complications of T1D, result from years of elevated blood sugar levels (JDRF Australia, 2018). Haemoglobin A1c or glycosylated haemoglobin (HbA1c) indicates average glucose level over the previous 2-3 months and is generally measured by health professionals 2-4 times per year (Diabetes

Australia, 2018). Poor glycaemic control refers to persistently elevated blood glucose levels or higher HbA1c level (JDRF, 2018). Previous research suggests that parent-adolescent communication factors have an influence on glycaemic control in adolescents, which can contribute to both better and poorer outcomes (Dashiff, Hardeman, McLain, 2007).

The frequency of blood glucose monitoring is an indicator of diabetes adherence (Moström, Ahlén, Imberg, Hansson, & Lind, 2017). Previous research has found a relationship between frequent self-monitoring of blood glucose levels and glycaemic control measured by HbA1c level (Miller et al., 2013). Although adherence directly influences glycaemic control, Borus and Laffel (2010) suggest that several other factors affect adherence among adolescents with T1D. These include unmodifiable factors such as age, gender, and diabetes duration, and modifiable factors, including diabetes-specific family conflict (Luyckx, Seiffge-Krenki, Missotten, Rassart, Casteels, & Geothals, 2013), parental involvement (King, Berg, Bunter, & Butler, 2014) and the use of technology to assist with diabetes self-management (Karges et al., 2017). Parent-adolescent communication is a modifiable factor that affects diabetes adherence (Iskander, Rohan, Pendley, Delamater, & Drotar, 2015). Identifying key communication factors and their influence on adherence (positive or negative) in the current review may further assist with development of strategies to achieve better adherence behaviour among adolescents with T1D. Self-efficacy was included as a self-management outcome as communication factors can directly influence level of confidence at performing diabetes tasks, which can either be adaptive or maladaptive for self-management outcomes (Berg et al., 2011).

1.4 Parent-adolescent communication

There is compelling evidence that productive (i.e., adaptive) parent-adolescent communication regarding diabetes self-management can improve health outcomes (Dashiff et

al., 2007; Iskander, Rohan, Pendley, Delamater, & Drotar, 2013; Palmer et al., 2011), and problematic (i.e., maladaptive) communication between parents and adolescents predicts poorer self-management outcomes (Dashiff et al, 2007; Ingerski, Anderson, Dolan, & Hood, 2010; Luyckx et al., 2013). Adaptive communication is defined as interactions with the parent that facilitated the adolescent's effective self-management of T1D, and maladaptive communication is defined as interactions with the parent that are associated with deficits related to self-management of T1D. Despite this evidence, communication is often characterised by conflict (Hillard, Holmes, Chen, Maher, Robinson, 2013) as parents are commonly reluctant to relinquish control and adolescents push for greater independence (Babler & Strickland, 2015). Furthermore, the rate of poorly controlled T1D in adolescence (10-19 years old; World Health Organisation, 2018) remains high, with only 27% meeting the recommended glycaemic control target (<7.5%) in 2017 (Phelan et al, 2017). Therefore, a greater understanding of key factors influencing positive parent-adolescent communication related to diabetes self-management is needed to identify modifiable factors to improve glycaemic control among adolescents and will be a key focus of this review.

Communication between parents and their adolescent with diabetes has been of interest to researchers for decades (Bobrow, AvRuskin, & Siller, 1985; Hauser et al., 1986), and links between parent-adolescent communication and self-management outcomes has been established (Iskander, Rohan, Pendley, Delamater, & Drotar, 2015). Empirical evidence specifically related to parent-adolescent communication was summarised in a previous review (Dashiff, Hardeman, & McLain, 2007), which identified a pattern of findings among several parental communication concepts and T1D outcomes. Given the established relationship between parent-adolescent communication with T1D self-management outcomes similar findings are expected, however this review will expand on the previous review by synthesising all available evidence since then (2007), to identify any differences in parent-

adolescent communication due to advances in technology and treatment regimens which represents a current gap in the literature.

1.4.1 Maladaptive parent-adolescent communication

We expect that the body of evidence related to conflict will be negatively associated with adherence and glycaemic control (Dashiff et al., 2007). This relationship has been well established in previous research. For example, higher levels of parental control that lack warmth has found to be maladaptive for adolescent diabetes self-management (Geothals et al., 2016). Specifically, adolescents who perceive their parents as being highly controlling (Seiffge-Krenki et al., 2013; Landers et al., 2016) are more likely to have greater problems with diabetes self-management than those who did not report these parental behaviours (Geothals et al., 2016). Lower levels of parental support characterised by high restrictiveness (Seiffge-Krenke et al. 2013) may lead to adolescents displaying more conflictual autonomy behaviours, including non-disclosure (Main et al. 2015, Osborn et al. 2013) and avoidance of communication with parents regarding diabetes self-care. Additionally, when parents continuously pressure adolescents (Karlsson et al., 2008) about self-management activities without further explanation or reasoning they may compromise adolescent competence for diabetes self-care and impede the development of self-efficacy, particularly among older adolescents (Berg et al., 2013, Butler et al., 2007). Parental use of persuasive strategies (Berg et al., 2013) to control adolescent self-care behaviour may be perceived as nagging (Karlsson et al., 2008) which was found to have detrimental effects on adherence (Carroll et al., 2011). Parents venting frustration regarding diabetes self-care, and being overly expressive (Miller & Jawad, 2014) may be interpreted as being a threat or an attack (Carroll et al., 2001), which in turn perpetuates the problem as adolescents withdraw (Main et al., 2015, Osborn et al. 2013) and become fearful of disclosing information about diabetes self-care (Babler et al., 2015). Evidence suggests that parents who exhibit psychological control (Geothals et al.,

2016) and coercion (Landers et al., 2016) can expect poorer adolescent adherence and glycaemic control.

Understandably, parents are heavily invested emotionally in their adolescents' health and well-being (Jaser, Linsky, & Grey, 2014), and the line of responsibility (Cameron et al. 2008) and level of competence during transition may not always be clear (Dashiff et al., 2011), however parental control characterised by anger (i.e. coercion, psychological control), has consistently associated with poorer adolescent adaptation (Landers et al, 2016; Barber, Olsen, & Shagle, 1994). This is consistent with an earlier review which found that conflict was significantly negatively associated with glycaemic control (Dashiff et al., 2007). Furthermore, research has linked parent psychological control with adolescent anxiety, depression (Rowe, Zimmer Gembeck, Rudolph & Nesdale, 2015), and emotion regulation (Rueth, Otterpohl & Wild, 2016). Therefore, it stands to reason that the same trajectory of problems exists within adolescent diabetes self-management and should be avoided. However, further research is needed within the context of T1D diabetes self-management.

1.4.2 Adaptive parent-adolescent communication

Dashiff et al. (2007) identified a positive association between parental warmth with diabetes self-management. It is likely that the more recent body of evidence related to support will reflect a similar pattern of results. High expressions of parental levels of control with warmth is associated as being beneficial for adolescent diabetes self-management (Geothals et al., 2016). Specifically, adolescents that perceive parental control as guidance (Gabrill et al., 2010) and warmth (Geffken et al., 2008) are more likely to have better diabetes outcomes than those who did not (Landers et al., 2016). Evidence suggests that higher levels of parental control characterised by warmth leads to more autonomous behaviours (Landers et al., 2016) such as adolescents seeking and expressing information about diabetes self-care (Miller & Jawd, 2018) and becoming more involved in problem-solving (Berg et al., 2008b) and

decision-making (Miller & Jawd, 2014). Parental control with warmth is characterised as being positive communication (Iskander et al., 2015) that can help to foster a supportive relationship with higher levels of agreement (Anderson et al, 2009), interpersonal enjoyment (Berg et al., 2008a), and parental encouragement (Karlsson et al., 2008), all of which are associated with adaptive T1D self-management outcomes. Adolescents who perceive a more positive tone of communication (Deboer et al., 2013) are likely to disclose more about their diabetes self-care (Osborn et al., 2013). Furthermore, a warm positive communication style (Iskander et al., 2015) is conducive to a better-quality relationship (Palmer et al., 2011; Berg et al., 2011), where parents are more able to openly express love, acceptance and appreciation for their adolescent (Berg et al., 2018a, Butler et al, 2007; Main et al., 2014) and be in a stronger position of power to encourage (Karlsson et al., 2008) optimal self-care behaviour. This is supported by evidence from the earlier review which found that positive emotion was significantly and positively associated with glycaemic control among younger adolescents (Dashiff et al., 2007). The current review aims to extend these findings by further identifying the extent and strength of the associations between positive parent-adolescent communication variables with specific T1D self-management outcomes, and if associations have changed or developed given recent advances in diabetes and communication technology.

1.5 Theory development

The Structural Analysis of Social Behavior (SASB) (Benjamin, 1996) is a theoretical model from which to understand and code interactions between parent and adolescent communication regarding T1D self-management. The model is viewed as having two overlapping surfaces. The top level (labelled in boldface) describes parental communication directed at the adolescent. The bottom level (labelled in italics) describes adolescent reactions to parent communication. The top and bottom layers correspond with each other. For example, parents who affirm and encourage adolescent behaviour (i.e., 1-2

Affirm/Encourage), can expect the adolescent will reciprocate by disclosing and expressing information (i.e., 2-2 Disclose/Express), see Figure 1. Benjamin (1996) suggests that interactions complement each other in a theoretically predictable and meaningful way. See Figure 1.

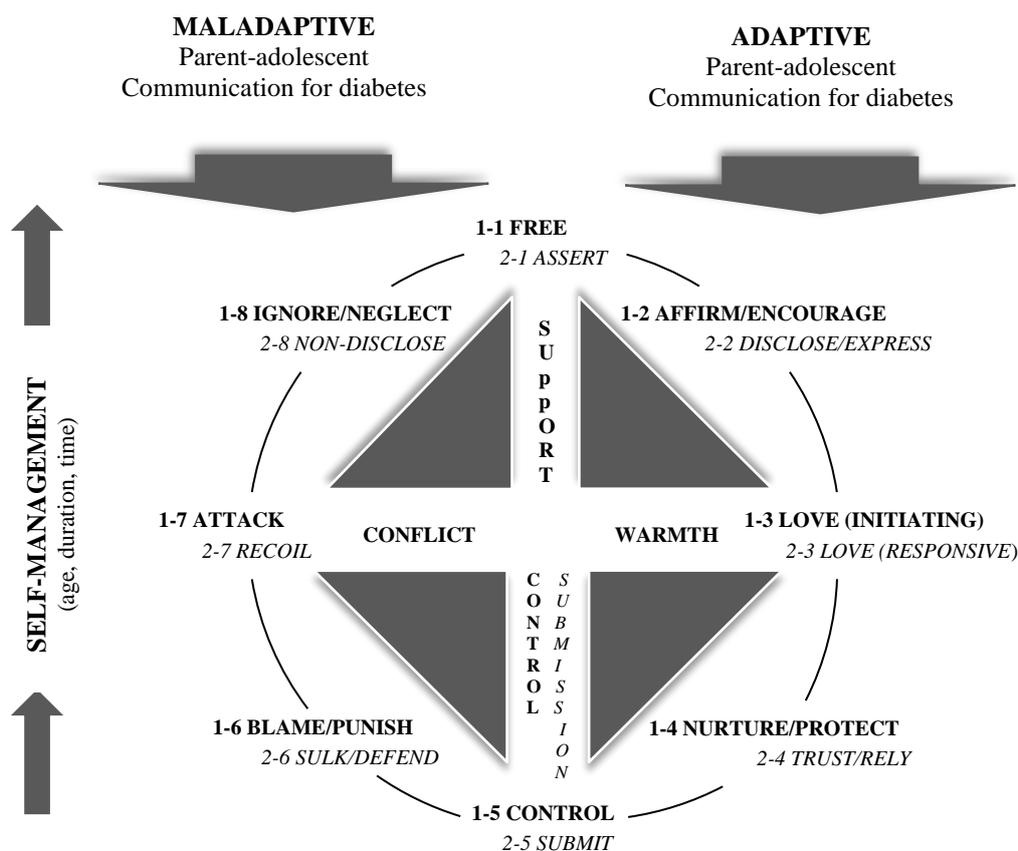


Figure 1. The structural analysis of social behaviour (SASB) adapted from Benjamin (1996) for parent-adolescent communication and diabetes self-management.

Further, the model suggests that parental control and parental support, is characterised with either warmth or conflict. For example, parental control with warmth (i.e., 1-4 nurture/protect) may be expressed as guidance, helping, and reminding the adolescent of self-management tasks. In contrast, parental control with conflict (i.e., 1-6 blame/punish) may be

expressed as being overly directive, laying blame or punishment for poor self-management behaviour. The model is designed to make inferences about how an adolescent or parent might respond to different types of communication. For example, if a parent expresses communication that is controlling yet warm (i.e., 1-4 nurture/protect), the model predicts that the adolescent will reciprocate by trusting and relying on parent guidance. (i.e., 2-4 trust/rely). (See Appendix C for code descriptions).

More recently, Berg et al. (2007) used the SASB model to help define parent-adolescent collaboration. The current review extends this model as relevant for parent-adolescent communication and T1D. Specifically, the model has been adapted for this review to include the prediction that self-management communication transitions from parental control to adolescent assertion (i.e. autonomy), over time, age, or diagnosis duration (shown the left side of the model). It also predicts that communication characterised by warmth is adaptive for adolescent self-management, and communication characterised by conflict (i.e. hostility) is maladaptive for adolescent self-management (shown at the top of the model), as evidenced in the literature. Identifying and coding parent-adolescent communication relevant to T1D self-management with this model may help to inform health care providers, users and policy makers about which communication trends are contributing to adaptive and maladaptive self-management. Furthermore, it will inform stakeholders to aid the development of education and intervention strategies with the aim of achieving optimal T1D outcomes for adolescents. Findings in this review were extracted and coded against the most relevant SASB criteria (see Appendix C). The current review is aiming to develop an existing theoretical model (SASB; Benjamin, 1996). Subsequently, findings in the current review are limited to one theory. However, other theories have been of interest to researchers on the topic of parent-adolescent communication and T1D including; Patterson's coercion model (Patterson, 2002), Kyngas' theoretical model of compliance (Kyngas, 2018),

Holmbeck's (1996) model of relational transformations between parent and adolescent, and Family Systems Therapy (Minuchin, 1985). A revised Behavioral Family Systems Therapy for Diabetes (BFST-D) intervention has achieved consistent positive results for family communication to improve glycaemic control, adherence, and family conflict (Wysocki et al., 2007, 2008).

1.6 The current study

Despite, many years of research from a range of observational and theoretical perspectives regarding parent-adolescent communication and self-management of T1D, there has been no attempt to review and synthesise recent available evidence. Furthermore, the extent and strength of findings associated with each T1D self-management outcome across the current body of evidence will be explored. Specifically there is a lack of this evidence in the T1D adolescent population. There has been no critical evaluation of the influence of recent technological advances including online communication and insulin regime, and its effect on the parent-adolescent relationship related to T1D self-management. A theoretical framework from which to evaluate all available evidence is needed to provide a platform for further conceptual development. A systematic critical review of this evidence is required to better understand useful communication strategies for parents and adolescents with T1D, to identify gaps in the knowledge-base, and identify priorities for future research. The availability of evidence-based parent-adolescent communication strategies is important for optimal diabetes self-management. Synthesizing these results will help to inform clinicians and researchers about which current communication methods may best enhance and facilitate optimal self-management among adolescents.

1.7 Aim

Consistent with the Australian National Diabetes Strategy 2016-2020 (Australian Government Department of Health, 2018), this review was intended to highlight the importance of parent-adolescent communication in influencing the occurrence of diabetes-related complications and quality of life among adolescents with T1D. The availability of current evidence-based parent-adolescent communication strategies may help the development of a structured self-management education program in Australia for parents and their adolescents during transition to adult services. Additionally, this review sort to identify use of diabetes and communication technology that may support parent-adolescent interactions to achieve more consistent self-management adherence and glycemic control for people in this age group.

The present review therefore aimed to produce a synthesis of findings from empirical studies (since the last review published in 2007) over the past 12 years about communication and interactions between parents and their adolescents' self-management of T1D. Specifically, this systematic review addressed the following three questions:

- (1) What are the important communication concepts between the parent-adolescent relationship and self-management of type 1 diabetes?
- (2) What is the extent and strength of knowledge about these concepts?
- (3) What are the implications for practice, theory development and research?

We expect that findings will compare to those of the past review by identifying similar primary communication variables. However, the current study is expected to extend the previous review by further exploration of parent-adolescent communication with self-management outcomes in the wake of recent technological advances. The current review will aim to identify the strength of relationship between communication factors with specific self-management outcomes, and relevant findings will be coded and adapted to a theoretical

model to achieve a better understanding of parent-adolescent communication patterns and their association with T1D self-management.

Chapter 2: Method

The methodology for this review was performed using the PRISMA framework for planning and conducting systematic reviews (Liberati et al., 2009). The review protocol was submitted for registration with PROSPERO on 18 June 2018, identification number 104530 (<https://www.crd.york.ac.uk/PROSPERO/>). All stages of the methodology from searching to extraction were performed by two independent reviewers and discrepancies were resolved by a third reviewer.

2.1 Search Strategy

Searches were conducted in PubMed, PscyInfo, CINAHL and Health Source Nursing/Academic Edition. The searches included all peer-reviewed journal articles between January 2006 and 28 May 2018. A backward search of reference lists from eligible articles, and a forward search of citations of eligible articles was also conducted.

The search strategy included terms related to the primary review question, and the key variables of interest being self-management and communication or interaction between parents and their adolescent child with type 1 diabetes. The search strings all comprised of the key terms “diabetes mellitus type 1” or “diabetes mellitus” or “diabet*” or “adolescents” or “adol*”. Terms related to communication between parent and adolescent included “parent-adol* communication” or “parent-child relations” or “parenting”. Terms related to self-management included “self-management” or “self-care” or “medication adherence” or “adher*” or “diet” or “exercise”. Search terms were modified to best suit each database and used in conjunction with the appropriate filters. The search strings and strategy used for each database is available in Appendix A.

Table 2. 1

Inclusion, Exclusion Criteria

Criteria	Code	Description
Inclusion	I1	Study sample included adolescents with type 1 diabetes (duration 6 months or longer) and/or their parents defined as either mothers, fathers, caregivers, guardians or step-parents, and
	I2	Study included a sample of adolescent participants aged 10 to 19 years or the sample had a mean that fell within this age range, and
	I3	A qualitative or quantitative study that featured any aspect of communication or interaction between parents and their adolescent with type 1 diabetes, or
	I4	Study that focused on parent or adolescent perceptions of communication behaviour or interaction; as well as studies of observed interaction, or
	I5	Intervention study if given to both parent and adolescent and had a focus on communication or interaction, and
	I6	Peer-reviewed journal article in English
Exclusion	E1	Study focus on broad family variables that do not specifically address communication or interaction between a parent and adolescent with type 1 diabetes.
	E2	Studies that do not met eligible sample criteria.
	E3	Systematic literature review.

In addition, review articles, books, conference abstracts, editorials, commentaries, and all other grey literature was excluded. The inclusion and exclusion criteria extend a previous review (Dashiff et al., 2007) which focused on parent-adolescent communication and self-management of type 1 diabetes. Studies published in 2006 that were included in Dashiff et al. (2007), were excluded in this review to allow for comparability of findings

2.3 Screening

A 3-stage screening process was conducted: duplicate screening, title and abstract screening, and full-text screening. After duplicate articles were identified and removed, title and abstracts were screened for eligibility as outlined in the criteria above. If information from the abstract was inadequate to determine eligibility, the article was retained for full-text screening. The full-text of all remaining articles was then retrieved and screened against the eligibility criteria and results were recorded in an Endnote library. Ineligible articles identified at full-text screening were removed with reasons. In addition, a screening quality check on 10% of ineligible articles was conducted by a third independent review author. 100% of included articles were confirmed by four reviewers. The search results and progression of article inclusion through the screening stages is presented in Figure. 2.



Figure 2. PRISMA flow chart for article inclusion based on initial search (31 May, 2018).

2.4 Data extraction

A data extraction form was pilot-tested on five randomly-selected studies and modified accordingly. The data was extracted by one review author and quality checked by a second review author. Information extracted included sample characteristics, study design, disease duration, insulin regime, communication type and primary related findings. For simplification, each finding was categorised under four main communication themes, including warmth, conflict, support, and control then identified as being adaptive or maladaptive communication based on positive or negative outcome related to self-management (including adherence, glycaemic control, and self-care). Each finding was then linked to the most relevant code associated with the adapted version of the Structural Analysis of Social Behaviour Simplified Cluster model (SASB-SC). A description of SASB Codes for optimal adolescent diabetes self-management was developed for this review (adapted from the original model) and summarised in Table 3 (Benjamin, 2003). A summary of data extracted is presented in Appendix B.

2.5 Methodological Quality

Study quality was assessed independently by two review authors, and disagreements were resolved by discussion, and with the involvement of the third review author when necessary. The risk of bias within studies was assessed considering the following characteristics: sample representativeness or selection bias, assessment of exposure and/or confounders, assessment of outcomes, evaluation of follow-up, evaluation of adjustment for confounding, comprehensive adjustment for residual confounding, statistical methodology, data presentation and missing data or attrition, and assessed with appropriate quality tools as follows (Hill, Pricor, & McKenzie, 2013). Risk of bias and study quality was assessed using an appropriate checklist for each study design. The Joanna Briggs Institute (JBI) Critical Appraisal Checklist adapted for cross-sectional studies (JBI, 2017c), cohort studies (JBI,

2017e), qualitative studies (JBI, 2017a), non-randomised controlled trials (JBI, 2017b), and randomised controlled trials (JBI, 2017d) were used. Each study was scored based on the extent that they met all criteria from the relevant checklist. The number of criteria on each checklist ranged from 8-13, and total possible quality scores ranged from 0-13. The adapted score scales for each checklist are detailed in Table. 2.2, where higher scores reflect better quality.

Table 2. 2

Adapted quality score scales for JBI Checklists.

Number. of criterion	JBI Checklist	Poor	Acceptable	Good	Excellent
8	Cross-sectional	0-2	3-5	6-7	8+
11	Cohort	0-3	4-6	7-8	9+
9	Non-randomised experimental	0-2	3-5	6-7	8+
13	Randomised controlled trial	0-4	5-7	8-10	11+
10	Qualitative	0-3	4-6	7-8	9+

Notes: yes = 1, no or unclear = 0 (criteria not applicable are removed).

To measure risk of bias, each criterion was scored as either 1 (yes) or 0 (no or unclear). Criteria scored as ‘not applicable’ were removed and the score scale was adjusted accordingly. Scores for each criterion were added to obtain an overall quality rating for each study, and categorised as either ‘excellent,’ ‘good,’ ‘acceptable’ or ‘poor’ quality. Excellent studies report strong methodology with lower risk of bias, and poor studies report weak methodology with higher risk of bias.

Additionally, NHMRC criteria was used to assess the ‘Level of Evidence for Quantitative Studies’ (NHMRC; 2009) and classified as follows: Level IV (case series, or

cross-sectional study), Level III-3 (case-control study), Level III-2 (retrospective cohort study, aetiology or a non-randomised experimental trial), Level III-1 (unselected or representative case series), Level II (prospective cohort study or a randomised controlled trial), and Level I (systematic reviews of Level II studies). Likewise, qualitative studies were assessed on four levels of evidence using published criteria (Daly, Willis, Small, Green, Welch, Kealy, & Hughes, 2007) as follows: Level IV (single case studies), Level III (descriptive studies), Level II (conceptual studies), and Level I (generalizable studies with conceptual frameworks). Level I for both tools is considered to be the most scientifically robust and valid.

The study quality appraisal found that quality was generally excellent. A summary of the study quality scores and levels of evidence for included journal articles are shown in Table 2.3 and Table 2.4. Twenty-six studies (63%) were of excellent quality, 14 studies (34%) were good quality and 1 study (2.5%) was of acceptable quality. No studies were found to be poor quality. All studies were thus retained and included in the review. Most of the studies were quantitative (90%), with 25 (68%) classified as Level IV studies, 10 (27%) classified as Level III-2 studies, and 2 (5%) classified as II studies. Three of the four included qualitative studies were of good quality and the remaining study was scored as excellent. All four (100%) were classified as Level IV studies. (See Appendix D for a full summary of results).

Table 2. 3

Quantitative studies, quality score, grade of recommendation and level of evidence

Author (date)	JBI Checklist	Quality Score	Grade of recommendation	Level of Evidence
Anderson et al. (2009)	JBI [^]	8	Excellent	IV
Berg et al. (2011)	JBI [^]	5	Good	IV
Berg et al. (2008)	JBI [^]	6	Good	IV

Berg et al. (2008)	JBIA^	5	Good	IV
Berg et al. (2013)	JBIA^	8	Excellent	IV
Berg et al. (2017)	JBIA^	8	Excellent	IV
Butler et al. (2007)	JBIA^	6	Good	IV
Cameron et al. (2008)	JBIA^	8	Excellent	IV
DeBoer et al. (2017)	JBIA^	6	Good	IV
Drew et al. (2010)	JBIA^	7	Excellent	IV
Ellis et al. (2007)	JBIA^	8	Excellent	IV
Geffken et al. (2008)	JBIA^	7	Excellent	IV
Geothals et al. (2016)	JBIA^	8	Excellent	IV
Grabill et al. (2010)	JBIA^^	9	Excellent	III-2
Helgeson et al. (2014)	JBIA^^	9	Excellent	III-2
Hillard et al. (2013)	JBIA^	8	Excellent	IV
Ingerski et al. (2010)	JBIA^^	9	Excellent	III-2
Iskander et al. (2015)	JBIA^^	9	Excellent	III-2
Lancaster et al. (2015)	JBIA^	7	Excellent	IV
Landers et al. (2016)	JBIA^	8	Excellent	IV
Lee et al. (2015)	JBIA^^	8	Excellent	II
Luyckx et al. (2013)	JBIA^^	7	Good	III-2
Main et al. (2014)	JBIA^	8	Excellent	IV
Main et al. (2015)	JBIA^	8	Excellent	IV
Miller & Jawad (2014)	JBIA^	8	Excellent	IV
Miller & Jawad (2018)	JBIA^^	9	Excellent	III-2
Miller et al. (2007)	JBIA^	5	Good	IV
Mlyanarczyk (2013)	JBIA^	4	Acceptable	IV
Monaghan et al. (2015)	JBIA^^^^	8	Excellent	III-2
Osborn et al. (2013)	JBIA^	7	Excellent	IV
Palmer et al. (2011)	JBIA^	6	Good	IV
Rohan et al. (2014)	JBIA^^	7	Good	III-2
Rybak et al. (2017)	JBIA^	6	Good	IV

Seiffge-Krenki et al. (2013)	JB ^I ^{^^}	9	Excellent	III-2
Vaid et al. (2017)	JB ^I [^]	8	Excellent	IV
Wu et al. (2014)	JB ^I ^{^^}	8	Excellent	III-2
Wysocki et al. (2007)	JB ^I ^{^^^}	10	Good	II

Table 2. 4

Qualitative studies, quality score, grade of recommendation, and level of evidence

Author (date)	Quality Score	Grade of recommendation	Level of Evidence
Babler et al. (2015)	8	Good	IV
Carroll et al. (2011)	9	Excellent	IV
Dashiff et al. (2011)	8	Good	IV
Karlsson et al. (2008)	8	Good	IV

Chapter 3: Results/Findings

3.1 Descriptive Statistics

From an initial pool of 336 articles, 80 full-text articles were examined for eligibility, and a total of 41 published research articles were reviewed. The study characteristics of all 41 studies have been extracted and summarized in Table 2.2 and organised by study design. Thirty-five studies were focused on adolescents within the American population, with a further six studies including samples from Germany (2), England (1), Belgium (1), Sweden (1), and Taiwan (1).

Thirty-seven of 41 studies were quantitative including two interventions and four were qualitative design. Data collection methods primarily consisted of survey results from adolescent and/or parent, medical records, and interviews. A summary of measures used for each theme was extracted and detailed below. Self-management outcomes included adherence, glycaemic control, and self-efficacy/self-management/self-care. No eligible studies reported outcomes related to diet or exercise.

The available data was synthesised by identifying relevant results related to adaptive and maladaptive parent-adolescent interactions associated with self-management. Sixteen studies reported adaptive outcomes, 13 studies reported maladaptive outcomes, and the remaining 12 studies reported evidence for both, and were so referenced twice in the following synthesis. For simplification, all relevant findings were grouped and synthesised from one of four communication themes, including warmth, conflict, support, and control.

3.2 Quantitative results

3.2.1 Warmth

Fifteen of 41 studies (37%) reported evidence ($n = 18$) related to parental warmth (Anderson et al., 2009; Berg et al., 2008; Berg et al., 2008a; Berg et al., 2001; Butler et al.,

2007; Deboer et al., 2017; Drew et al., 2010; Geffken et al., 2008; Iskander et al., 2015; Lancaster et al., 2015; Main et al., 2014; Miller & Drotar, 2007; Osborn et al., 2013; Palmer et al., 2011; & Raybak et al., 2017). Diabetes self-management outcomes were measured as adherence (n = 8), glycaemic control (n = 8), and self-efficacy (n = 2). In the current review, studies that reported interactions related to parental warmth also included relationship quality (3), communication (3) interpersonal enjoyment (1), agreement (3), acceptance (3) and disclosure (2), and results are synthesized as follows.

3.2.1.1 Adherence

Eight of 16 studies related to warmth reported a relationship with adherence (Berg et al., 2008; Berg et al., 2008a; Drew et al., 2010; Iskander et al., 2015; Main et al., 2014; Miller & Drotar, 2007; Osborn et al., 2013; & Palmer et al., 2011). A 3-year longitudinal study on parent-adolescent communication found different but positive effects related to mothers and fathers. Both findings were characterised by warmth, which reported that maternal positive communication increased over time to predict better adherence 3 years later, while paternal negative communication decreased over time (Iskander et al, 2015). Further evidence reported that parental positive communication was associated with better adherence (Millar & Drotar, 2007). Mothers were found to have a strong influence on diabetes management related to warmth, with higher mother and adolescent perceived interpersonal enjoyment related to better adherence (Berg et al, 2008). Further evidence of maternal warmth on adherence was also reported in relation to disclosure. Evidence suggested that higher disclosure to parents was positively associated with adherence (Osborn et al., 2013), and that disclosure to mothers but not fathers was related to better daily adherence (Berg et al., 2017). Studies that measured parental acceptance and relationship quality were also consistently characterised with parental warmth and again reported a similar pattern of results.

Adolescent reports of greater mother and father acceptance (Berg et al., 2008a; Main et al.,

2014) and relationship quality (Drew et al., 2010; Palmer et al., 2011) predicted better diabetes adherence. In addition to this evidence, higher quality relationships were associated with higher self-efficacy, and subsequently better adherence (Berg et al., 2011).

3.2.1.2 Glycaemic control

Eight of 15 studies related to warmth reported a similar pattern of results with glycaemic control (Anderson et al., 2009; Berg et al., 2008a; Deboer et al., 2017; Drew et al., 2010; Geffken et al., 2008; Lancaster et al., 2015; Palmer et al., 2011; & Raybak et al., 2017). A study (Geffken et al., 2008) that specifically measured warmth found that higher adolescent perceptions of parental warmth were associated with a decrease chance of adolescent experiencing a diabetic ketoacidosis (DKA) episode. Three studies (Lancaster, et al., 2015; Rybak et al., 2017; Anderson et al., 2009) that measured agreement reported positive outcomes for glycaemic control. Higher parent-adolescent agreement was associated with better glycaemic control (Lancaster, et al., 2015; Rybak et al., 2017) and the same pattern of results was reported in a cohort study (Anderson et al., 2009) which found that agreement was a significant predictor of glycaemic control in the younger cohort only (<12 years old). This evidence suggests that adolescent age may be a factor. A study that measured positive tone of communication found the same pattern of results, predicting better glycaemic control (Deboer et al., 2017). Adolescent-parent relationship quality and parental acceptance was associated with positive outcomes for self-management. Higher relationship quality was associated with better glycaemic control (Drew et al., 2010; Palmer et al., 2011), while adolescent perceived father acceptance predicted the same positive results (Berg et al., 2008a).

3.2.1.3 Self-efficacy

Two out of 15 studies related to warmth reported findings related to self-efficacy (Berg et al., 2011; & Butler et al., 2007). Higher parent-adolescent relationship quality

predicted greater self-efficacy and subsequently better adherence. Further evidence reported a relationship between parental acceptance and adolescent self-management, which found that adolescent perceptions of mother acceptance was associated with better self-management, particularly for older girls. These findings are consistent with adherence and glycaemic control and suggests that age and gender are factors that influence parent-adolescent communication regarding self-management.

3.2.2 Conflict

Fifteen of 41 studies (37%) reported evidence (n = 18) related to parent-adolescent conflict (Anderson et al., 2009; Cameron et al., 2008; Deboer et al., 2017; Hillard et al., 2013; Ingerski et al., 2010; Lancaster et al., 2015; Lee et al., 2015; Luyckx et al., 2013; Main et al., 2014; Main et al., 2015; Miller & Drotar, 2007; Osborn et al., 2013; Rohan et al., 2014; Rybak et al., 2017; & Vaid et al., 2017). Diabetes self-management outcomes were measured as adherence (n = 5), glycaemic control (n = 12) and self-care (n = 1). In the current review, studies that reported interactions related to parent-adolescent conflict also included secrecy (2), negative communication (1), and disagreement (1), and results are synthesised as follows.

3.2.2.1 Adherence

Five of 15 studies reported similar results between conflict and adherence (Luyckx et al., 2013; Main et al., 2014; Main et al., 2015; Miller & Drotar, 2007; & Osborn et al., 2013). Higher parent adolescent conflict was associated with poorer adherence (Luyckx et al., 2013; Main et al., 2014). Likewise, negative communication between adolescent and parent were predicted poorer adherence (Miller & Drotar, 2007). Associations between adolescent secrecy, and adherence were also reported with greater secrecy predicting lower diabetes adherence (Main et al., 2015; Osborn et al., 2013).

3.2.2.2 *Glycaemic control*

Twelve of 15 studies reported a similar pattern of results regarding conflict and glycaemic control (Anderson et al., 2009; Cameron et al., 2008; Deboer et al., 2017; Hillard et al., 2013; Ingerski et al., 2010; Lancaster et al., 2015; Lee et al., 2015; Main et al., 2014; Main et al., 2015; Rohan et al., 2014; Rybak et al., 2017; & Vaid et al., 2017). Greater parent-adolescent conflict was associated with poorer glycaemic control (Anderson et al., 2009; Hillard et al., 2013; Ingerski et al., 2010; Lancaster et al., 2015; Lee et al., 2015; Main et al., 2014; Rohan et al., 2014, & Vaid et al., 2017) and lower parent-adolescent conflict predicted better glycaemic control (Rybak et al., 2017). These findings were all consistent, however results differed depending on perspective. Parent-reported conflict was associated with poorer glycaemic control (Lancaster et al., 2015), and mother-reported conflict predicted worse glycaemic control (Main et al., 2014) with further evidence suggesting the same trend over time (Rohan et al., 2014). In a cohort study, greater parent-adolescent conflict at baseline for the 10 to 12-year-old cohort predicted higher HbA1c levels at 6 months. Similar evidence was reported in a longitudinal study, which found that higher conflict at baseline was associated with poorer glycaemic control at follow up (Lee et al., 2015). Disagreement and secrecy were also characterised by conflict. Higher parent-adolescent disagreement about diabetes responsibility was associated with poorer glycaemic control (Cameron et al., 2008). This was supported by further evidence which found that discrepancies between parent and adolescent reports of communication frequency predicted poorer glycaemic control and greater conflict (DeBoer et al., 2007). This is consistent with other evidence that reported adolescent secrecy from mothers also predicted poorer glycaemic control (Main et al., 2015).

3.2.2.3 *Self-care*

One out of 15 studies reported results between conflict and self-care (Hillard et al., 2013). The Hillard et al. (2013) study described a similar pattern of results between conflict

and self-care, with evidence that suggests higher parent-adolescent conflict is associated with poorer self-care.

3.2.3 Support

Thirteen of 41 studies (32%) reported evidence ($n = 13$) related to parental support (Berg et al., 2017; Ellis et al., 2007; Geffken et al., 2008; Geothals et al., 2016; Grabill et al., 2010; Helgeson et al., 2014; Landers et al., 2016; Miller & Drotar, 2007; Mlyanarczyk, 2013; Seiffge-Krenki et al., 2013; & Wu et al., 2014). Diabetes self-management outcomes were related to adherence ($n = 11$) and glycaemic control ($n = 2$). In the current review, studies that reported interactions related to parental support also included autonomy support (2), negative parenting (2), decision making (1), and parent responsiveness (1). Results were synthesized as follows.

3.2.3.1 Adherence

Eleven of 13 studies reported evidence related to parental support and diabetes adherence (Berg et al., 2017; Ellis et al., 2007; Geothals et al., 2016; Grabill et al., 2010; Helgeson et al., 2014; Landers et al., 2016; Miller & Drotar, 2007; Mlyanarczyk, 2013; & Wu et al., 2014). A similar pattern of results was found across three of these studies, which found higher adolescent-reported parental support predicted better adherence (Mlyanarczyk et al., 2013; Helgeson et al., 2014; Ellis et al., 2007). Adolescent-reported autonomy support was also associated with better adherence (Landers et al., 2016), however, a longitudinal study reported evidence to suggest that autonomy support may decrease over time (Wu et al., 2014). Parent responsiveness and negative parenting were also categorised as support with contrasting results. Higher parent responsiveness was associated with better adherence (Geothals et al., 2016), and adolescent-reported negative parenting was associated with poorer adherence (Grabill et al., 2010). Further evidence that found greater adolescent seek, adolescent express, and parent-adolescent joint decision making, predicted better adherence

from both perspectives (Miller & Jawad, 2018). In other relevant research, parent-perceived decision making predicted poorer adherence (Millar & Drotar, 2007), and greater disclosure to mothers but not fathers was associated with better daily adherence (Berg, 2017).

3.2.3.2 *Glycaemic control*

Two of 13 studies that examined support were related to glycaemic control (Geffken et al., 2008; & Seiffge-Krenki et al., 2013). The Seiffge-Krenki et al. (2011) study that measured parental support found evidence to suggest that lower parental support was associated with poorer glycaemic control. This finding contrasts with parental negativity, which found that lower parental negativity predicted better glycaemic control (Geffken et al., 2008).

3.2.4 **Control**

Nine of 41 studies (22%) reported evidence related to parental control (Berg et al., 2013; Butler et al., 2007; Geothals et al., 2016; Grabill et al., 2010; Helgeson et al., 2014; Landers et al., 2016; Miller & Jawad, 2014; & Seiffge-Krenki et al., 2013). Diabetes self-management outcomes were related to adherence (n = 5), glycaemic control (n = 2) and self-efficacy (n = 2). In the current review, studies that reported interactions related to parental control also included coercion, restrictiveness, guidance, and parental expression. Results were synthesised as follows.

3.2.4.1 *Adherence*

Five of 9 studies reported evidence related to parental control and adherence (Geothals et al., 2016; Grabill et al., 2010; Helgeson et al., 2014; Landers et al., 2016; & Miller & Jawad, 2014). The evidence reported that lower psychological control was associated with better adherence (Geothals et al., 2016), and higher parental control predicted better adherence, but only when friend support was low (Helgeson et al., 2014). Further

evidence related to control, reported that higher coercion (Landers et al., 2016) and greater parent expression (e.g. giving opinion and information) was associated with poorer adherence (Miller & Jawad, 2014). By contrast, adolescent-reported parental guidance was associated with better adherence (Grabill et al., 2010).

3.2.4.2 Glycaemic control

Two of 9 studies reported evidence related to parent control and glycaemic control (Berg et al., 2013; & Geothals et al., 2016). Relationships were found between perceived parental social support and glycaemic control, in families with high restrictiveness. Lower levels of parental support characterised by family high restrictiveness predicted greater declines in glycaemic control (Seiffge-Krenke et al., 2013). This contrasts findings with parent persuasive strategies, with evidence reporting that adolescent-perceived maternal persuasive strategies were positively associated with next day blood glucose levels (Berg et al., 2013).

3.2.4.3 Self-management and self-efficacy

Two of 9 studies reported evidence related to parent control and self-efficacy (Berg et al., 2013; & Butler et al., 2007). Maternal firm control was associated with poorer self-management among older adolescents (Butler et al., 2007). Further evidence reported that adolescent perceptions of maternal persuasive strategies were associated with intrusive support which reduced daily confidence for those high in self-efficacy (Berg et al., 2013).

3.3 Qualitative results

Four of 41 studies (10%) were qualitative of design. Participants included adolescents only (Babler et al., 2015; Karlsson et al., 2008) or both parent and adolescent (Carroll et al., 2011; Dashiff et al. 2011). Interviews were conducted on all participants in each study (n = 80) for a duration of approximately 60 minutes (ranging from 45-75 minutes) (Babler et al.,

2015; Carroll et al., 2011; Dashiff et al., 2001; & Karlsson et al., 2008). Maladaptive interactions characterised by conflict and parental control were identified across all studies. The most prominent common theme was nagging, persistent checking, and never-ending questions about self-management (Babler et al., 2015; Carroll et al., 2011; Dashiff et al., 2011; & Karlsson et al., 2008). Parents reported that scolding, judging and getting emotional was an interference (Dashiff et al., 2011) and adolescents reported that struggling for independence, worrying about reactions of others and building trust were also sources of conflict (Karlsson et al., 2008). Adaptive interactions characterised by parental support were reported in two studies (Dashiff et al., 2008; Karlsson et al., 2008). Parent supported adolescent self-management by reminding, noticing positive aspects of their management, granting more freedom, stressing complications, promoting and assuming more responsibility, and getting tough (Dashiff et al., 2011). Parental encouragement was also identified as supporting progress toward self-management (Karlsson et al., 2008).

3.4 Interventions

Two of 41 studies (5%) assessed the effects of communication interventions on blood glucose monitoring (glycaemic control) and adherence. All participants in the pilot study were offered the 'Checking In' intervention (Monaghan, et al., 2015), and participants in the randomized controlled trial were placed in one of three groups (Wysocki et al., 2007). Participants in a randomized trial that aimed to improve diabetes-related family conflict, adherence and glycaemic control were allocated to one of three groups: standard care (SC), multifamily education support (ES) or behavioural family systems therapy for diabetes (BFST-D; Wysocki et al., 2007). Twelve sessions for ES and BFST-D spanned 6 months. Measures obtained at baseline, and follow-up at 6, 12 and 18 months, indicated a significant improvement in adherence for BFST-D youth compared to other groups, which correlated with an improvement in HbA1c at each follow-up. Participants in the physician-delivered

intervention, 'Checking in', aimed to increase parent-adolescent communication about blood glucose monitoring (Monaghan et al., 2015) completed baseline questionnaires, and the intervention spanning 12 weeks, that involved regular three-minute meetings (3MM) to review blood glucose levels and solve problems. Blood glucose monitoring frequency increased with improved HbA1c and parental diabetes collaboration from pre- to post-intervention. The active intervention period ranged from 3 months (Monaghan, et al., 2015) to 6 months (Wysocki et al., 2007), and periods for outcome assessment ranged from 3 months (Monaghan, et al., 2005) to 18 months post-baseline (Wysocki et al., 2007). Positive trends in blood glucose monitoring frequency (Monaghan, et al., 2005) and adherence (Wysocki, et al., 2007) correlated with improvement in HbA1c (Wysocki et al., 2007; Monaghan, et al., 2015) and parent collaboration (Mohaghan, et al., 2015) pre- to post intervention.

Chapter 4: Discussion/Conclusion

Parent-adolescent communication is a key modifiable factor to improve self-management of T1D. The present review aimed to produce a synthesis of findings from empirical studies over the past 12 years (since the earlier review 2007) about communication and interactions between parents and their adolescents' self-management of T1D.

Specifically, this systematic review addressed the following:

4.1 What are the important communication concepts?

As predicted the primary communication concepts between the parent-adolescent relationship and T1D self-management was warmth, conflict, support, and control. This was similar to the earlier review which identified support, warmth and involvement as productive parental communication; and conflict, negative affect and control as problematic parental communication. The important communication concepts will be identified and discussed in more detail in the following analysis.

4.2 What is the extent and strength of knowledge about these concepts?

Dashiff et al. (2007) reported a positive relationship between parental support with glycaemic control and self-care, adherence, or self-management. Evidence from the current review found similar plus additional relationships for parental support and T1D self-management outcomes. Specifically, the current review found the same positive relationship between support with adherence (Berg et al., 2017; Ellis et al., 2007; Geothals et al., 2016; Grabill et al., 2010; Helgeson et al., 2014; Landers et al., 2016; Miller & Drotar, 2007; Mlyanarczyk, 2013; & Wu et al., 2014), and glycaemic control (Geffken et al., 2008; & Seiffge-Krenki et al., 2013). However, on further analysis, the majority of positive findings were linked with adherence (85%), which suggests that support has a stronger association with adherence than glycaemic control. This evidence suggest that the measure of adherence may be a stronger predictor of self-management behaviour.

Dashiff et al. (2007) reported a positive relationship between parental warmth with glycaemic control only. Evidence from the current review found similar plus additional relationships for parental warmth and T1D self-management outcomes. Specifically, the current review found the same positive relationship between warmth and glycaemic control (Anderson et al., 2009; Berg et al., 2008a; Deboer et al., 2017; Drew et al., 2010; Geffken et al., 2008; Lancaster et al., 2015; Palmer et al., 2011; & Raybak et al., 2017). A study (Geffken et al., 2008). The current review extended findings from the earlier review by identifying additional positive relationships between warmth with adherence (Berg et al., 2008; Berg et al., 2008a; Drew et al., 2010; Iskander et al., 2015; Main et al., 2014; Miller & Drotar, 2007; Osborn et al., 2013; & Palmer et al., 2011) and self-efficacy (Berg et al., 2011; & Butler et al., 2007). Further analysis revealed a similar number of findings with adherence and glycaemic control, which suggests that they may equally be important in measuring parent warmth and self-management behaviour related to warmth.

Dashiff et al. (2007) reported a positive relationship between parental involvement and glycaemic control. Parental involvement in the current review was excluded. This was due to the board scope of variables identified within the subscales that did not specifically relate to communication. However, it is evident in other research that parent involvement is a predictor of better glycaemic control (Hillard, et al., 2013; Wiebe, et al., 2010).

Dashiff et al. (2007) reported a negative relationship between parental conflict with glycaemic control and self-care, adherence, or self-management. As expected, evidence from the current review found similar relationships for parent-adolescent conflict and T1D self-management outcomes. Specifically, the current review found the same negative relationship between conflict with glycaemic control (Anderson et al., 2009; Cameron et al., 2008; Deboer et al., 2017; Hillard et al., 2013; Ingerski et al., 2010; Lancaster et al., 2015; Lee et al., 2015; Main et al., 2014; Main et al., 2015; Rohan et al., 2014; Rybak et al., 2017; & Vaid

et al., 2017). and adherence (Luyckx et al., 2013; Main et al., 2014; Main et al., 2015; Miller & Drotar, 2007; & Osborn et al., 2013). On further analysis, the majority of negative findings were linked with glycaemic control (67%), which suggests that conflict has a stronger association with glycaemic control than adherence. This evidence suggest that the measure of glycaemic control may be a stronger indicator of self-management behaviour related to conflict.

Dashiff et al. (2007) reported a negative relationship between parental control with quality of life only. No relationship was identified as being associated with glycaemic control, adherence, or self-care. Evidence from the current review found no similar relationship. Quality of life was excluded in the current review, as it was not deemed to be a measure of diabetes self-management, but rather an overall well-being. However, it is quite surprising that no relationship was identified in the previous review with any self-management outcomes. This may be due to the author, identifying control, as conflict. The current review found a relationship between parental control with adherence (Geothals et al., 2016; Grabill et al., 2010; Helgeson et al., 2014; Landers et al., 2016; & Miller & Jawad, 2014), glycaemic control (Berg et al., 2013; & Geothals et al., 2016), and self-efficacy (Berg et al., 2013; & Butler et al., 2007). Further analysis revealed that the most findings were linked with adherence (62%). This suggest that adherence may be a stronger indicator of self-management behaviour related to control. Further analysis revealed both positive and negative findings related to parental control. Specifically, parental guidance (Grabill et al., 2010) and lower psychosocial control (Geothals et al. 2016) was found to have a positive effect on adherence, whilst parent coercion (Landers, et al., 2016), higher parental restrictiveness (Seiffge-Krenki et al., 2013) and firm control (Butler et al., 2007) were found to have a negative effect of self-management. Interestingly, parental persuasion, was found to predict both positive and negative outcomes for self-management. Further research is needed

in the area of parent persuasion, to further identify which persuasive strategies are most effective at improving adolescent self-management.

Dashiff et al. (2007) reported a negative relationship between negative affect and glycaemic control. Parental negative affect in the current review was excluded. This was due to the board scope of variables identified within the subscales that did not specifically relate to communication. However, it is evident in other research that parental negative affect is a predictor of poorer self-management outcomes (Jaser, Linsky, & Grey, 2014; Streisand & Austin, 2008).

4.1 Findings in the context of the SASB Model

The results were synthesised in the context of the SASB model, which allowed findings to be identified as being a blend (e.g., control with warmth), rather than distinct individual communication constructs. The distribution of results is summarised in table Table 4.1.

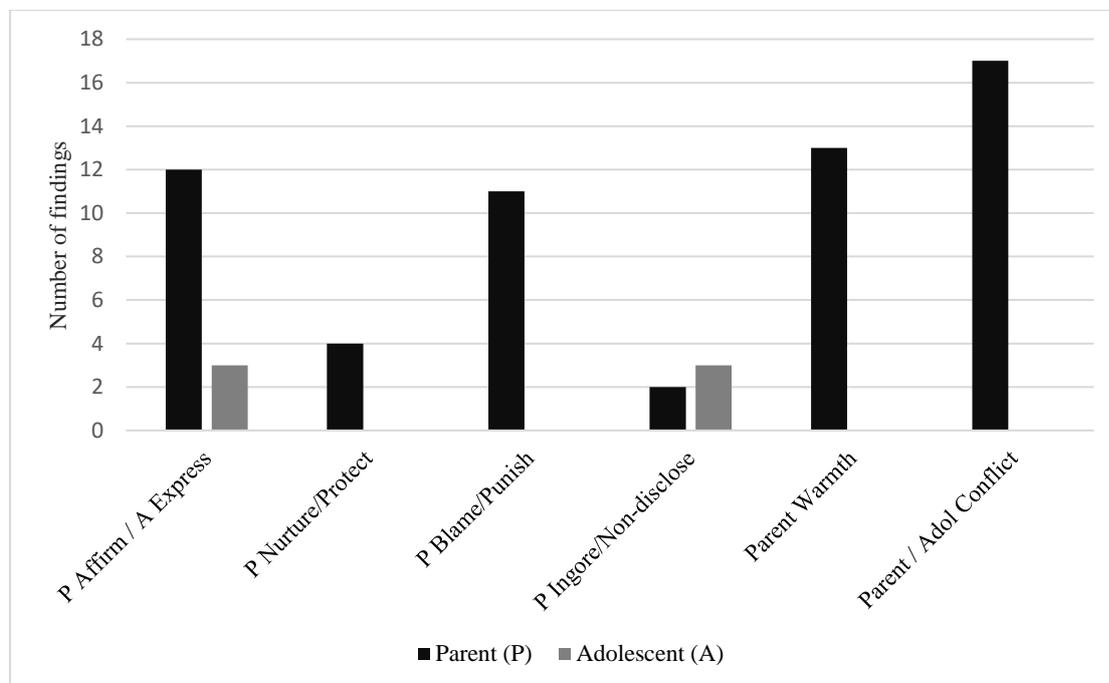


Table 4. 1 Distribution of findings in the context of the adapted SASB Model (Benjamin, 2003)

4.2.1 Conflict (control plus support)

The distribution of findings based on the SASB Model, indicates that parent-adolescent conflict was of most interest to researchers (Anderson et al., 2009; Cameron, et al., 2008; DeBoer et al., 2017; Grabill et al., 2010; Hillard et al., 2013; Ingerski et al., 2010; Lancaster et al., 2015; Lee et al., 2015; Luyckx et al., 2013; Main et al., 2014; Miller & Drotar, 2007; Rohan et al., 2014; Rybak et al., 2017; Vaid et al., 2017). This in part, may be due to study designs that measured conflict alongside other variables of interest, such as emotion-regulation (Berg et al., 2017) related to T1D self-management. The SASB model suggests that adolescents perceived their parents' communication as being conflictual, and characterised by blaming, punishing, ignoring and being neglectful (SASB code, 1-6+1-8) about their adolescents' diabetes self-management. Specifically, higher parent-adolescent conflict was found to be maladaptive for glycaemic control (Anderson et al., 2009; Cameron, et al., 2008; DeBoer et al., 2017; Hillard et al., 2013; Ingerski et al., 2010; Lancaster et al., 2015; Lee et al., 2015; Luyckx et al., 2013; Main et al., 2014; Rohan et al., 2014; Rybak et al., 2017), adherence (Grabill et al., 2010, Main et al., 2014, Miller & Drotar, 2007) and self-care (Hillard et al., 2013). Furthermore, disagreements (Cameron et al., 2008), and discrepancies between parent adolescent communication frequency (Deboer et al., 2017); adolescent perceived negative parenting (Grabill et al., 2010), lower levels of positive parent communication, higher negative communication (Miller & Drotar, 2007), and lower parent-adolescent conflict (Rybak et al., 2017) predicted better self-management outcomes. Furthermore, the model predicts that adolescents reciprocate hostile (i.e., conflictual) parent communication by sulking, defending, non-disclosing and being defiant (SASB code, 2-6+2-8) about diabetes self-management (Benjamin, 2003). This pattern of negative communication was found to be problematic in cohort studies, which found that higher

perceived conflict at baseline, predicted poorer glycaemic control at 6-months (Ingerski et al., 2010; Lee et al., 2015), and three years (Luyckx et al., 2013; Rohan et al., 2014) later.

4.2.2 Warmth (control plus support)

Findings related to parental warmth was also a common theme reported in 13 cases on the SASB Model (Anderson et al, 2009; DeBoer et al., 2017; Drew et al., 2010; Geffken et al., 2008; Geothals et al., 2016; Iskander et al., 2015; Lancaster et al., 2015; Palmer et al., 2011; Rybak et al., 2017; Dashiff et al., 2011). The model suggests that adolescents in those studies perceived their parents' communication as being affirming and encouraging plus nurturing and protecting (SASB code: 1-2+1-4). Specifically, higher parental warmth was associated with being adaptive for adherence (Drew et al., 2010, Goehals et al., 2016; Iskander et al., 2015; Palmer et al., 2011), glycaemic control (Anderson et al., 2009; Deboer et al., 2017; Drew et al., 2010; Geffken et al., 2008; Lancaster et al., 2015; Palmer et al., 2011; Rybak et al., 2017) and self-management (Dashiff et al., 2011). The body of evidence related to warmth was from an adolescent perspective, focused on the parent. (i.e., parental warmth). Interpreting the findings related to parental warmth; the SASB model predicts that the adolescent reciprocates parental warmth by communicating trust, asking for guidance (and accepting it), disclosing information and expressing competence for diabetes self-care (SASB code, 2-6+2-8). The model provides a powerful resource for understanding how parent communication patterns might predict, or positively influence adolescent communication behaviour to achieve better outcomes for diabetes self-management. Patterns of positive communication was found to be stable over time, as evident in a cohort study which found that higher positive communication at baseline predicted greater adherence 3-years later (Iskander et al, 2015).

Evidence in this review found a consistent pattern over time related to both conflict and warmth, such that higher parental warmth predicts better self-management outcomes

over time, and higher parent-adolescent conflict predicts poorer self-management outcomes over time (Ingerski et al., 2010; Iskander et al., 2015; Lee et al., 2015; Luyckx et al., 2013; Rohan et al., 2014) which suggests that changing the trajectory of maladaptive communication regarding diabetes self-management may be difficult to curb. This presents a significant challenge for parents, clinicians, and researchers, as many adolescents in Australia with T1D are not meeting the recommended glycaemic level (Phelam et al., 2017).

4.2.3 Parental control with conflict

Findings related to parental control characterised by conflict was reported in 11 cases (Berg et al., 2013; Butler et al., 2007; Geothals et al., 2016; Landers et al., 2016; Miller & Jawad, 2014; Seiffge-Krenki et al., 2013; Babler et al., 2015; Carroll et al., 2011; Dashiff et al., 2011; Karlsson et al., 2008; Monaghan et al., 2015). The model suggests that adolescents in those studies perceived their parents' communication as being both controlling and conflictual (i.e. SASB code, 1-6 Blame/punish). Higher parental control with conflict was associated as being maladaptive for adherence (Landers et al., 2016; Miller & Jawad, 2014; Carroll et al., 2011), glycaemic control (Geothals et al., 2016; Seiffge-Krenki et al., 2013), self-efficacy (Berg et al., 2013, Butler et al., 2007;), self-management (Dashiff et al., 2011; Karlsson et al., 2008; Monaghan et al. 2015), and self-care (Babler et al., 2015). Specifically, parents were perceived as being intrusive (Berg et al., 2013), restrictive (Seiffge-Krenki et al., 2013), and overly expressive (Miller & Jawad, 2014). Furthermore, they were perceived as being coercive (Landers et al., 2016) with firm control (Butler et al., 2007), and exerting psychological control (Geothals et al., 2016). Adolescents reported persistent nagging (Balber et al., 2015; Carroll et al., 2011; Karlsson et al., 2008); and parents interfering with self-management by constantly scolding, judging, and checking (Dashiff et al., 2011), with many disagreements (Cameron et al., 2008) The body of evidence related to control with conflict

(SASB code, 1-6) in this review is predominantly from an adolescent perspective, focused on the parent. (i.e., parental control). The SASB model predicts that adolescents would likely respond to parent control with conflict, by sulking, appeasing parents, defending, and justifying actions, being apathetic in compliance, sacrificing their own self-management abilities and being fearful (Benjamin, 2003). There is a lack of evidence in this review (as illustrated in the distribution of findings in table 4.1) about adolescent responses to parental control. However, adolescent emotional responses to parental control has been an area of interest to researchers in relation to diabetes self-management (Berg et al., 2017; Reuth, Otterpohl, & Pike, 2016).

4.2.4 Parental control with warmth

Findings related to parental control characterised by warmth was found in four cases (Berg et al., 2013; Goethals et al. 2016; Grabill et al., 2010; Helgeson et al., 2014). The SASB model suggests that adolescents in those studies perceived their parents' communication about T1D self-management as being both controlling and warm (i.e. SASB code, 1-4 Nurture/protect). Higher parental control with warmth was associated as being adaptive for glycaemic control (Berg et al., 2013), and adherence (Grabill et al., 2010; Goethals et al., 2016; Helgeson et al., 2014). Specifically, parents were perceived as expressing low psychological control (Goethals et al., 2016), using effective persuasive strategies (Berg et al., 2013), with guidance and behavioural control (Grabill et al., 2010; Helgeson et al., 2014). The body of evidence related to control with warmth (SASB code, 1-4) in this review is from the adolescent perspective, focused on the parent. (i.e., parental control). The SASB model predicts that adolescents would likely respond to parent control with warmth by trusting, relying, asking for permission, learning from parents' behaviour, being happy to follow rules and accept care taking (Benjamin, 2003). The lack of available evidence in this review, suggest that more research is required specifically within the area of

positive parental control that is characterised by warmth. Given the current prevalence of non-adherence among adolescents, suggests that parental control with warmth is an important communication factor, that warrants more attention in future research.

4.2.5 Parental support with warmth

Findings related to parental support characterised by warmth was found in 12 cases (Berg et al., 2008a; Berg et al., 2008b; Berg et al., 2011, Butler et al., 2007; Ellis et al., 2007; Helgeson et al., 2014; Landers et al., 2016; Main et al., 2014; Miller & Jawad, 2014; Mylanarczyk, 2013; Karlsson et al., 2008; Wysocki et al., 2007). The SASB model suggests that adolescents in those studies perceived their parents' communication as being both supportive and warm (i.e., SASB code, 1-2 Affirm/encourage). Higher parental support with warmth was associated as being adaptive for adherence (Berg et al., 2008a; Ellis et al., 2007; Helgeson et al., 2014; Landers et al., 2016; Main et al., 2014; Miller and Jawad, 2014; Mlyanarczyk, 2013; Wysocki et al., 2007), glycaemic control (Berg et al., 2008a; Wysocki et al., 2007), self-efficacy (Berg et al., 2011; Butler et al., 2007), and self-management (Karlsson et al., 2008). Specifically, parents were perceived as being supportive (Ellis et al., 2007, Helgeson et al., 2014; Mlyanarczyk, 2013) and accepting (Berg et al., 2008b; Butler et al., 2007, Main et al., 2014). Parents offered support for self-management autonomy (Landers et al., 2016), shared interpersonal enjoyment (Berg et al., 2008a); and encouraged joint decision making (Miller & Jawad, 2014). Furthermore, Behavioural family systems therapy for diabetes (BFST) was identified as being supportive through reducing conflict and fostering the development of a quality parent-adolescent relationship (Wysocki et al., 2007). The SASB model predicts that adolescents would likely respond to parental support with warmth, by openly disclosing information about their diabetes self-management, feeling comfortable to express feelings, feeling relaxed about communicating with their parent, and asserting self-management autonomy (Benjamin, 2003). The quantity of available evidence

suggests that parental support with warmth is an area of significant interest to researchers. This may reflect the need for research to identify ways parents can enact positive support, in the wake of conflictual communication patterns, to encourage poorly controlled adolescents back to better glycaemic control and adherence. Further research is needed to identify how parents can be proactive in changing maladaptive communication patterns, and how that may differ between younger and older adolescents.

4.2.6 Adolescent disclosure and expression

Findings related to adolescent disclosure and expression (i.e., SASB code, 2-2 Disclose/Express) related to parental support with warmth was found in three cases (Berg et al., 2017; Miller and Jawad, 2018; Osborn et al., 2013). Higher adolescent disclosure and expression was associated with better adherence (Berg et al., 2017; Miller and Jawad, 2018; Osborn et al., 2013). Specifically, greater adolescent disclosure (Osborn et al., 2013) to mothers (Berg et al., 2017), and greater adolescent seek, adolescent express, and joint decision making (Miller and Jawad, 2018) was associated with better diabetes adherence. This pattern of findings supports the predictions of the SASB model, which suggests that parental support characterised by warmth may elicit a positive response from adolescents who would feel more comfortable to disclose and express information regarding their diabetes self-management, without fear of retribution. Strategies that encourage adolescent disclosure, may include the use of mobile technology, which has been found to be useful in diabetes self-management (Ristau, Yang, & White, 2013).

4.2.7 Parental non-support

Findings related to parental non-support (i.e., support that characterised by conflict) was found in two cases (Seiffge-Krenki et al, 2013; Wu et al., 2014). The SASB model suggests that parents who are non-supportive (i.e., SASB code, 1-8 Ignore/neglect) tend to neglect the needs for their adolescent regarding diabetes self-care, they may be dismissive,

leave their adolescent in the lurch, and ignore or forget about their needs (Benjamin, 2003). Seiffge-Krenki et al. (2013) reported that lower adolescent perceived parental support predicted poorer glycaemic control. Wu et al. (2014) found that while parent autonomy support, and blood glucose monitoring frequency (BGMF) decreased over time, adolescent-reported conflict decreased, and parent-reported conflict increased overtime. This pattern of findings suggests that the adolescents withdraw from parental support and adopt maladaptive self-management behaviours, against their parents' wishes. This is an important communication concept that suggests the balance of power regarding diabetes responsibility shifts from the parent (i.e., parental control), toward the adolescent (i.e., adolescent autonomy) as they begin to make their own choices about diabetes self-care. This pattern was evident in another study (Ingerski et al., 2010) which found that parent-adolescent conflict was associated with an observed decreased in BGMF (i.e., poorer adherence), and an increase in HBA_{1c} (i.e., poorer glycaemic control) as the adolescent aged. This evidence suggests that power struggles between parents and adolescents may be an area of interest in future research, and the shift in balance of power particularly during older adolescence.

4.2.8 Adolescent non-disclosure

Findings related to adolescent non-disclosure (i.e., SASB code, 2-8 Non-disclosure) was found in three cases (Main et al., 2015; Osborn et al., 2013). Greater adolescent non-disclosure was associated with poorer adherence (Main et al., 2015; Osborn et al., 2013) and glycaemic control (Main et al., 2015). Specifically, adolescents were associated with being secretive about their diabetes self-care (Main et al., 2015; Osborn et al., 2013). The SASB model suggest that adolescent who express non-disclosure may refuse assistance, detach from parent support, be uninterested in diabetes self-care, be defiant by doing the opposite, or go their own separate way (Benjamin, 2003). As such, maladaptive self-management behaviour

associated with adolescent non-disclosure may be mediated by non-modifiable factors including age and diagnosis duration.

4.3 Implications for practise, theory development and research

Findings from the present study have multiple implications for parent-adolescent communication and self-management of T1D. In addition to earlier research that identified productive and problematic communication concepts (Dashiff et al., 2007) related to self-management of T1D, our findings indicate that interventions aimed at targeting parental control may be most effective at improving diabetes self-management outcomes (e.g., glycaemic control and adherence) among adolescents. Specifically, future research should aim to explore how parental control characterised by either conflict or warmth, relates to adolescent adaption of diabetes self-management during the transition of responsibility toward independence; including what the modifiable communication factors are, and if parental control differs between younger and older adolescents. The need for parental control may be buffered by the uptake of automatic blood glucose self-monitoring technology and other self-management devices, however the current high prevalence of poor glycaemic control and parent-adolescent conflict, suggests that more parental control is needed. Evidence of the impact of technology on parent-adolescent was not evident in this review. However, the likely increase use of communication technology (Ristau et al., 2013) among adolescents including smart phones and social media may be a barrier for parent-adolescent communication. Future research should aim to explore which modes of communication are most utilised by this population, and how parents can use communication technology to best support their adolescents' self-management of T1D to minimise the occurrence of interpersonal confrontation.

Due to the prevalence of non-adherence (Phelan, 2017), reported conflict between parents and adolescents regarding diabetes self-management, and evidence suggesting that

parental control has a significant influence (Butler, et al., 2007; Geothals et al., 2016; Helgeson et al., 2014; Landers et al., 2016), parental control may be the most important communication concept on which future research and interventions focus. Communication methods designed to slow down the transition toward adolescent self-management autonomy may help buffer the turbulence of external influences and adverse effects of variable rates of personal development (Helgeson et al., 2013). Communication that focuses or promotes ways that parents can retain some level of responsibility through involvement has shown to be beneficial for adherence (Hillard, et al., 2013; Wiebe, et al., 2010). A communication plan from the onset of T1D, as agreed by both parties, may help set expectations for the adolescents about how parents intend on being involved in their diabetes self-management transition, including systematic adjustments to communication based on adolescent self-care competence and diabetes self-management compliance.

Parents and adolescents having an expectation that optimal adherence may digress due to age-related psychosocial adjustment (Hood et al, 2006) can help them recognise that they are going through normal age-appropriate challenges, and subsequently may be more receptive to retain, adopt or revert to parental control strategies to guide them back toward optimal self-care behaviours. By setting adolescent expectations that parental control and support is important for their self-management and what that will entail, particularly during older adolescence may be helpful. Furthermore, education about the probable challenges, could help adolescents to recognise problematic situations before they occur and feel comfortable to ask parents for support as they arise. The development of resilience (Jasser & White, 2010) and the clearly stipulated retention of parental control and support, may put adolescents in better stead to cope with the persistent diabetes regime over time.

4.4 Control versus autonomy support

Parental ‘control support’, rather than ‘autonomy support’ (Bunter et al., 2009) may be a more appropriate term given this approach to promote the ongoing involvement of parents and to shy away from promoting the goal of being fully autonomous. There may be a pressure or expectation for adolescents to achieve self-management milestones as soon as possible, and before they start spending more time away from home, however this approach may demote the role of parent control-support and subsequently have detrimental effects on adherence. The fundamental reason for suggesting this approach is the lack of glycaemic control among this population which is a significant problem with serious implication for health and quality of life. Therefore, promoting control rather than autonomy is warranted in the current climate.

4.5 Limitations

This review was limited by several factors. First, a meta-analysis was not conducted on this data, as the current study aimed to replicate a similar design to an earlier review to allow for comparability and extension of findings (based on the inclusion of recent research and scope to include technological advances). Further, there is heterogeneity of findings among the included studies, in terms of the diversity of measures used and the way in which the studies were undertaken, and further a meta-analysis was not possible for the scope of this thesis. The body of included studies may have been susceptible to some response bias due to the high prevalence of self-reported data used to measure communication. However, the study quality review indicated the majority of exposure was measured using valid and reliable tools with good to excellent internal consistency (i.e., $\alpha > .60$) (Arron, Arron, & Croups, 2009).

Additionally, only articles that specifically featured aspects of communication or interaction were included in the review. Studies that reported elements of communication

within broader contexts that did not feature communication (e.g., parenting style, responsibility, monitoring, and involvement) were excluded. However, due to the variation of communication variables and methods used to measure them, some relevant studies may have been unintentionally excluded. To minimize this risk, two or three authors reviewed studies to determine eligibility for inclusion. Another limitation was that database selection and search terms may not have captured all relevant published studies. A search of reference lists and citations of eligible articles was performed to capture any additional relevant studies. Of the included studies, only findings specifically related to communication and self-management outcomes were extracted. However, other findings may be important in mediating the relationship between communication and self-management outcomes but were not a focus of this review. The current review only focused on communication between parents and adolescents, however relationships with extended family, siblings and other peer support may be influential and were not included in this review. Finally, most of the studies were conducted with an American population, and subsequently findings from this review may not be generalizable to the Australian population. Further research is required within Australia.

4.6 Strengths

Despite some limitations, the present study featured several methodological strengths. The current review followed the PRISMA statement for systematic reviews (Liberati, A. et al., 2009) to minimise bias. The evidence base consisted of 41 studies (including 37 quantitative and four qualitative studies) that fit pre-specified eligibility criteria, to answer three specific questions related to parent-adolescent communication and self-management of T1D. The assessment of risk of bias, using quality review tools (NHMRC level of evidence criteria, and JBI Critical Appraisal checklists) indicated that most studies were classified as Level IV evidence (68%) or above, and were of good to excellent quality (97%). The

consistency of study results between parent-adolescent communication and self-management outcomes was high, indicating an excellent strength of association between studies from which inferences (implications) were drawn. This strengthens the potential clinical impact of the proposed recommendations from this review. The generalisability of the body of evidence to the target population was acceptable with all participants meeting prespecified criteria, including age, diagnosis, and disease duration. However, again the generalizability to the Australian population was limited.

All stages of the review were quality checked by two to three authors, to minimise risk of bias, clarify discrepancies, reduce unintentional error, and ensure a consistent and quality interpretation of the data. The date range (i.e., January 2006 to December 2007) was designed to capture all available evidence since the previous review, published in 2007. To allow for complete comparability of findings studies that were included in the earlier review in 2006 were excluded from the current review. The date range was deemed to be an adequate amount of time, to allow for comparability of findings, particularly in the wake of changing diabetes and communication technology, which may have had an impact on parent-adolescent communication, and the ongoing interest to improve health outcomes for adolescents with T1D.

4.7 Conclusion

This systematic review aimed to provide an overview of parent-adolescent communication and self-management of type 1 diabetes over the past 12 years (since the previous review). The examination of 41 studies found that parent-adolescent communication continues to be highly influential for T1D self-management outcomes. In alignment with the three primary aims of this review, the adapted SASB model provided a framework from which all findings were logically grouped (i.e., warmth, conflict, support, and control) and the available evidence was synthesized for each identified self-management outcome (i.e.,

adherence, glycemic control, and self-management, self-care, or self-efficacy). The model also provided an opportunity to identify and code findings that reflect a combination of dimensions i.e. control and support with either warmth or conflict (see table 4.1). Parental warmth and conflict yielded the most findings, followed by parental support, then control. Warmth and support was found to be consistently adaptive for self-management outcomes (e.g., Berg et al., 2008a; Iskander et al., 2015; Geffken et al., 2008), conflict was consistently associated with maladaptive outcomes (e.g., Lancaster et al., 2015; Main et al., 2014; Rohan et al., 2014), and control was associated with both adaptive (e.g., Grabill et al., 2010; Berg et al., 2013), and maladaptive (Butler et al., 2007; Seiffge-Krenke et al., 2013) outcomes. Adherence and glycaemic control were the most prominent measures used to assess self-management. The synthesis revealed that conflict was most strongly associated with glycaemic control (80%), whilst support and control was most strongly associated with adherence (73% and 63%, respectively), and warmth was neutral between glycaemic control and adherence (44%).

Findings from this review suggest the need for standardised diabetes treatment plans to incorporate a specific parent-adolescent communication component. A tailored communication support program for individuals and their families is warranted given the poor adherence rates among adolescents, and the strength of evidence from this review. Findings from this review suggest that interventions that help to distinguish between adaptive and maladaptive controlling communication may be beneficial for parent-adolescent relationship and subsequently diabetes self-management, particularly in the earlier years, when parents tend to have more control in diabetes management and positive long-term trajectories for self-management may be better established. This evidence contrasts and extends on the previous review which suggested that interventions to decrease parental controlling communication may be beneficial (Dashiff et al., 2007). Whilst control is a

challenging issue for both parents and adolescents, evidence from this review suggests that it can be perceived as being positive or negative communication, or both. Parental control is a fundamental communication element involved in the transition of diabetes self-care from parent to adolescent. The burden of responsibility undergoes a transition that naturally leads to greater adolescent autonomy in self-management responsibility. The speed of this transition is a factor to consider in future research.

The challenges of this transition are evident based on the higher levels of reported conflict between parents and adolescents and poor glycaemic control, which suggest that more attention is warranted around parental control. The development and uptake of automatic blood glucose self-monitoring, and insulin pump technology may reduce some of the communication burden, (e.g., persistent nagging and trust-building) which was not clearly evident in this review but may help and be an area for further exploration in research. By having a conceptual understanding (i.e., adapted SABS, 2018) that adolescent autonomy will happen with or without optimal adherence and glycaemic control, highlights the importance of parents being able to adapt and relinquish control through timely autonomy granting support, and to be in the most optimal position to drive a positive transition, rather than the adolescent fighting (conflict) for independence and impairing the relationship.

The challenges are wide and varied, however targeting key areas (i.e., parental control) that underpin much of the undesirable behaviour and diabetes outcomes could have a substantial and positive impact for those living with T1D and their families.

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Items in **bold are review articles*

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Appendix A

Search syntax for parent-adolescent communication and self-management of type 1 diabetes.

Pubmed

Search	Query
#1	((diabetes mellitus[Title/Abstract]) OR diabetes mellitus, type 1[Title/Abstract]) OR diabetes mellitus[MeSH Terms] OR diabetes mellitus, type 1[MeSH Terms]
#2	adolescent[MeSH Terms]
#3	((parent-child relations*[Title/Abstract]) OR parent-adolescent relations*[Title/Abstract]) OR parent-child communication[Title/Abstract] OR parent-adolescent communication[Title/Abstract] OR parenting[Title/Abstract] OR parent-child relations[MeSH Terms]
#4	((self-management[Title/Abstract]) OR self-care[Title/Abstract]) OR blood glucose self-monitoring[Title/Abstract] OR exercise[Title/Abstract] OR diet[Title/Abstract] OR adherence[Title/Abstract] OR glycaemic control[Title/Abstract]

Filters: Publication date from 2006/01/01 to 2018/05/31, English, Article type: Journal article

CINAHL via EbscoHost

Search	Query
#1	Diabet* AND "type 1"
#2	adoles* OR teenager*
#3	"parent-child relations*" OR "parent-child communication" OR "parent-adolescent relations*" OR "parent-adolescent communication" OR "parenting"
#4	"self-management" OR "self-care" OR "blood glucose self-monitoring" OR "medication adherence" OR "exercise" OR "diet" OR "adherence" OR "glycemic control" OR "glycaemic control"

Limiters - Published Date: Jan 2006 to May 2018; Peer Reviewed; Research Article; English Language **Search modes** - Boolean/Phrase

PsycINFO via Ebscohost

Search	Query
#1	diabet* AND "type 1"
#2	adoles* OR teenager*
#3	"parent-child relations*" OR "parent-child communication" OR "parent-adolescent relations*" OR "parent-adolescent communication" OR parenting
#4	"self-management" OR "self-care" OR "blood glucose self-monitoring" OR "exercise" OR "diet" OR "adherence" OR "glyc* control"

Limiters - Published Date: Jan 2006 to May 2018; Publication Type: Peer Reviewed Journal;
English **Search modes** - Boolean/Phrase

Health Source: Nursing/Academic Edition via Ebscohost

Search	Query
#1	Diabet* AND "type 1"
#2	adoles* OR teenager*
#3	"parent-child relations*" OR "parent-child communication" OR "parent-adolescent relations*" OR "parent-adolescent communication" OR "parenting"
#4	"self-management" OR "self-care" OR "blood glucose self-monitoring" OR "exercise" OR "diet" OR "adherence" OR "glyc* control"

Limiters - Published Date: Jan 2006 to May 2018; Scholarly (Peer Reviewed) Journals
Search modes - Boolean/Phrase

Appendix B

Summary of included articles by design ($n = 41$). *A* = Adolescent, *P* = Parent, *F* = Father, *M* = Mother, < = lower, > = greater.

Author/s	Sample	Design	Major theme	Parent-Adolescent communication	Diabetes self-management outcome	Primary relevant findings	Adaptive / maladaptive communication for self-management	Related code
<i>Quantitative</i>								
Anderson et al. (2009)	121 youth (2 cohorts: Younger <i>M</i> = 10.6 yrs.; Older <i>M</i> = 13.5 yrs.) and P	Cross-sectional (groups: <12 yrs., and >12 yrs.)	Warmth	P-A agreement	Glycaemic control	Higher P-A agreement = > glycaemic control in younger group only.	Adaptive	1-2+1-4
			Conflict	P-A conflict	Glycaemic control	Greater P-A conflict = < glycaemic control.	Maladaptive	1-6+1-8
Berg et al. (2008a)	84 youth (age 11.5-17.5; <i>M</i> = 14.16) and M	Cross-sectional	Warmth	P-A interpersonal enjoyment	Adherence	Greater M and A -perceived interpersonal enjoyment = > adherence.	Adaptive	1-2
Berg et al. (2008b)	185 youth (ages 10-14; <i>M</i> = 12.52), M and F	Cross-sectional	Warmth	P acceptance	Adherence	Greater A -perceived M and F acceptance = > adherence.	Adaptive	1-2
			Warmth	P acceptance	Glycaemic control	A -perceived F acceptance = > glycaemic control. (A -perceived that F acceptance was lower than M acceptance.)	Adaptive	1-2
Berg et al. (2011)	252 youth (ages 10-14; <i>M</i> = 12.5), M and F	Cross-sectional	Warmth	P-A relationship quality	Self-efficacy	High quality P-A relationship = > self-efficacy, and subsequently > adherence.	Adaptive	1-2
Berg et al. (2013)	180 youth (ages 10.5-15.5; <i>M</i> = 12.87), M and F	Cross-sectional (daily assessments across 14 days)	Control	P persuasive strategies	Glycaemic control	A -perceived M persuasive strategies = > next-day glycaemic control.	Adaptive	1-4
			Control	P persuasive strategies	Self-efficacy	A -perceived M persuasive strategies = > intrusive support = < daily confidence for A high in self-efficacy.	Maladaptive	1-6
Berg et al. (2017)	236 youth (<i>M</i> age = 17.76)	Cross-sectional (daily assessments across 14 days)	Warmth	A disclosure	Adherence	Disclosure to M but not F = > daily adherence.	Adaptive	2-2

Butler et al. (2007)	78 youth (age 11.58-17.42; <i>M</i> = 14.21) and M	Cross-sectional	Warmth	M acceptance	Self-efficacy	A -perceived M acceptance = > self-efficacy, particularly for older A and girls.	Adaptive	1-2
			Control	P firm control	Self-efficacy	P firm control = < A self-efficacy, particularly among older A .	Maladaptive	1-6
Cameron et al. (2008)	2062 youth (ages 11-18; <i>M</i> = 14.4) and 1973 P	Cross-sectional (21 sites, 19 countries)	Conflict	P-A disagreement	Glycaemic control	Higher P-A disagreement about responsibility = < glycaemic control.	Maladaptive	2-6
DeBoer et al. (2017)	110 youth (ages 12-18, <i>M</i> = 14.5) and P	Cross-sectional	Warmth	P-A tone of communication	Glycaemic control	A -perceived positive tone of communication = > glycaemic control.	Adaptive	1-2+1-4
			Conflict	P-A communication frequency	Glycaemic control	Discrepancies between P and A -reported communication frequency = < glycaemic control and > conflict	Maladaptive	1-6+1-8
Drew et al. (2010)	252 youth (ages 10-14; <i>M</i> = 12.5)	Cross-sectional	Warmth	P-A relationship quality	Adherence	A -perceived M and F relationship quality = > adherence.	Adaptive	1-2+1-4
			Warmth	P-A relationship quality	Glycaemic control	A -perceived M and F relationship quality = > glycaemic control.	Adaptive	1-2+1-4
Ellis et al. (2007)	99 youth (ages 12-18; <i>M</i> = 14.8) and P	Cross-sectional	Support	P support	Adherence	A -perceived P support = > adherence. (P support with P monitoring was stronger predictor of adherence).	Adaptive	1-2
Geffken et al. (2008)	100 youth (ages 7-18; <i>M</i> = 13.79) and P	Cross-sectional	Warmth	P warmth	Glycaemic control	A -perceived P warmth = > glycaemic control. (Lower chance of DKA episode)	Adaptive	1-2+1-4
			Support	P negativity	Glycaemic control	A -perceived lower P negativity = > glycaemic control	Adaptive	1-2+1-4
Geothals et al. (2016)	521 youth (ages 14-25; <i>M</i> = 18.45) and P	Cross-sectional	Control	P psychological control	Adherence	P-A perceived lower psychological control = > adherence, especially for older A .	Adaptive	1-4
			Control	P psychological control	Glycaemic control	A -perceived M psychological control = < glycaemic control.	Maladaptive	1-6
			Support	P responsiveness	Adherence	Higher A -perceived P responsiveness = > adherence, especially for older A .	Adaptive	1-2+1-4
Grabill et al. (2010)	224 youth (ages 8-18; <i>M</i> = 13.82) and P	Longitudinal (3-time points annually for 2-yrs)	Control	P guidance	Adherence	A -perceived P guidance and control = > adherence (but not warmth).	Adaptive	1-4
			Support	P negative communication	Adherence	A -perceived negative parenting = < adherence.	Maladaptive	1-6+1-8
Helgeson et al. (2014)	117 youth (<i>M</i> = 18.15)	Cross-sectional	Support	P support	Adherence	P support = > adherence.	Adaptive	1-2
			Control	P control	Adherence	P control = > adherence, when friend support was low.	Adaptive	1-4

Hillard et al. (2013)	257 youth (ages 11-14; <i>M</i> = 12.8) and P	Cross-sectional	Conflict	P-A conflict	Glycaemic control	P-A conflict = < glycaemic control.	Maladaptive	1-6+1-8
			Conflict	P-A conflict	Self-care	P-A conflict = < self-care.	Maladaptive	1-6+1-8
Ingerski et al. (2010)	147 youth (ages 13-18, <i>M</i> = 15.5) and P	Longitudinal (2-time points, baseline and 6mths)	Conflict	P-A conflict	Glycaemic control	Higher P and A -perceived conflict at baseline = < glycaemic control at 6 months. (< BGMF and > HbA1c were observed with increasing A age.)	Maladaptive	1-6+1-8
Iskander et al. (2015)	217 youth (ages 9-11; <i>M</i> = 10.53) and P	Longitudinal (2-time points, baseline and 3-yrs)	Warmth	P-A communication	Adherence	A and M positive communication at baseline = > adherence 3 years later. (M and F negative communication decreased over time. A and M positive communication increased over time.)	Adaptive	1-2+1-4
Lancaster et al. (2015)	64 youth (ages 8-18; <i>M</i> = 13.89) and P	Cross-sectional	Warmth	P-A agreement	Glycaemic control	P-A agreement = > glycaemic control.	Adaptive	1-2+1-4
			Conflict	P-A conflict	Glycaemic control	P -perceived conflict = < glycaemic control	Maladaptive	1-6+1-8
Landers et al. (2016)	167 youth (ages 8-16; <i>M</i> = 12.87) and P	Cross-sectional	Support	P autonomy support	Adherence	A -perceived P autonomy support = > adherence.	Adaptive	1-2
			Control	P coercion	Adherence	P-A perceived higher coercion = < adherence.	Maladaptive	1-6
Lee et al. (2015)	210 youth (ages 10-18; 3 cohorts: 10-12yrs, 13-15yrs, 16-18yrs) and P	Longitudinal (2-time points, baseline and 6-mths)	Conflict	P-A conflict	Glycaemic control	Greater P -perceived conflict for 10-12years cohort at baseline = > HbA1C levels 6 months later.	Maladaptive	1-6+1-8
Luyckx et al. (2013)	109 youth (ages 11-15; <i>M</i> = 13.17 at baseline)	Longitudinal (4-time points over 3-yrs)	Conflict	P-A conflict	Adherence	F-A conflict (but not M-A conflict) = < adherence over time, and subsequently < glycaemic control.	Maladaptive	1-6+1-8
Main et al. (2014)	118 youth (<i>M</i> age = 12.74) and M	Cross-sectional	Warmth	P acceptance	Adherence	A -perceived M and F acceptance = > adherence.	Adaptive	1-2
			Conflict	P-A conflict	Adherence	M -perceived conflict = < adherence.	Maladaptive	1-6+1-8
			Conflict	P-A conflict	Glycaemic control	M -perceived conflict = > HbA1c	Maladaptive	1-6+1-8
Main et al. (2015)	247 youth (<i>M</i> age = 17.76)	Cross-sectional	Conflict	A -secrecy	Glycaemic control	Secrecy from M = < glycaemic control.	Maladaptive	2-8
			Conflict	A -secrecy	Adherence	Secrecy from M and F = < adherence.	Maladaptive	2-8
Miller & Jawad (2014)	89 youth (ages 8-19; <i>M</i> = 13.61) and P	Cross-sectional	Support	P-A decision-making	Adherence	Joint P-A decision making = > adherence.	Adaptive	1-2

			Control	P expression	Adherence	Greater P express (opinion and information) = < P -perceived adherence.	Maladaptive	1-6
Miller & Jawad (2018)	117 youth (3 cohorts, ages 8-16, <i>M</i> = 12.87)	Longitudinal (5 time points, over 2 yrs)	Support	P-A decision-making	Adherence	Greater A seek, A express, joint P-A decision-making = > A and P reported adherence.	Adaptive	2-2
Miller & Drotar (2007)	63 youth (ages 11-17; <i>M</i> = 13.3)	Cross-sectional	Warmth	P-A positive communication	Adherence	Low levels of P positive communication = < adherence, and < BGMF	Maladaptive	1-6+1-8
			Conflict	P-A negative communication	Adherence	A and P negative communication = < adherence.	Maladaptive	1-6+1-8
			Support	P-A decision making	Adherence	P -perceived decision-making = < adherence	Maladaptive	1-6+1-8
Myanarczyk (2013)	102 youth (ages 12-18; <i>M</i> = 15)	Cross-sectional	Support	P support	Adherence	A -perceived P support = > adherence.	Adaptive	1-2
			Osborn et al. (2013)	183 youth (ages 10-14; <i>M</i> = 14.1), M and F	Cross-sectional	Warmth	A disclosure	Adherence
Palmer et al. (2011)	252 youth (ages 10-14; <i>M</i> = 12.49) and P	Cross-sectional	Conflict	A secrecy	Adherence	Greater A secrecy = < adherence.	Maladaptive	2-8
			Warmth	P-A relationship quality	Adherence	M and F relationship quality = > adherence	Adaptive	1-2+1-4
Rohan et al. (2014)	239 youth (ages 9-11; <i>M</i> = 10.54) and P	Longitudinal (6month intervals, over 3-yrs)	Warmth	P-A relationship quality	Glycaemic control	M and F relationship quality = > glycaemic control	Adaptive	1-1+1-4
			Conflict	P-A conflict	Glycaemic control	Higher M -perceived conflict = < glycaemic control over time.	Maladaptive	1-6+1-8
Rybak et al. (2017)	161 youth (ages 12-18, <i>M</i> = 14.65) and P	Cross-sectional	Conflict	P-A conflict	Glycaemic control	Lower P-A conflict = > glycaemic control.	Adaptive	1-6+1-8
			Warmth	P-A agreement	Glycaemic control	Greater P-A agreement = > glycaemic control.	Adaptive	1-2+1-4
Seiffge-Krenki et al. (2013)	109 youth (<i>M</i> age at baseline = 13.77) and P	Longitudinal (3-time points annually for 2-yrs)	Support	P support	Glycaemic control	Lower A -perceived P support = < glycaemic control.	Maladaptive	1-8
			Control	P restrictiveness	Glycaemic control	A -perceived restrictiveness and < initial glycaemic control subsequently = < P support.	Maladaptive	1-6
Vaid et al., (2017)	93 youth (ages 13-17; <i>M</i> = 15.12) and P	Cross-sectional	Conflict	P-A conflict	Glycaemic control	P-A conflict = < glycaemic control (higher HbA1C)	Maladaptive	1-6+1-8
Wu et al. (2014)	239 youth (ages 9-11; <i>M</i> = 10.5) and M	Longitudinal (4-time points over 3-yrs)	Support	P autonomy support	Adherence (BGMF)	P autonomy support and BGMF decreased over time. (A -reported conflict < and P -reported conflict > over time)	Maladaptive	1-2

Qualitative

Babler et al. (2015)	15 youth (ages 11-15; $M = 13.9$)	Qualitative (60min interviews)	Conflict	P-A conflict	Self-care	A reported conflict with P and self-care. Relevant themes identified: struggling for independence, nagging, and building trust.	Maladaptive	1-6	
Carroll et al. (2011)	10 youth (ages 14-18) and P	Qualitative (semi-structured interviews)	Conflict	P nagging	Adherence	P nagging was identified as the main source of P-A diabetes conflict.	Maladaptive	1-6	
Dashiff et al. (2011)	23 families with A (age 16-18 years)	Qualitative (interviews)	Support	P support	Self-management	P supported A self-management: reminding, noticing positive aspects of the adolescent management, and granting more freedom, stressing complications, fostering responsibility, getting tough and parent assuming more responsibility.	Adaptive	1-2+1-4	
				P-A conflict	Self-management	P -reported interference with A self-management: scolding and judging, checking, and nagging.	Maladaptive	1-6	
Karlsson et al. (2008)	32 youth (ages 13-17; $M = 14.5$)	Qualitative (interviews)	Support	P encouragement	Self-management	P encouragement supported individual progress towards self-management.	Adaptive	1-2	
			Conflict	P nagging	Self-management	P-A conflict was associated with nagging, never-ending questions about self-management activities.	Maladaptive	1-6	
<i>Intervention</i>									
Monaghan et al. (2015)	30 youth (ages 11-15; $M = 12.67$) and P	Intervention (physician-delivered, 2-time points, spanning 12-wks)	Conflict	P-A communication	Adherence, BGMF, Glycaemic control	P -perceived conflict decreased, blood glucose monitoring increased, and HbA1c decreased, pre- to post-intervention	Adaptive	1-6	
Wysocki et al. (2007)	104 youth (M age = 14.2, $SD = 1.9$)	Intervention (4-time points: 0, 6, 12, 18 mths)	Warmth	P-A relationship quality	Adherence and glycaemic control	Behavioural family systems therapy for diabetes (BFST) = > adherence and > glycaemic control pre- to post- intervention.	Adaptive	1-2	

Appendix C

Adapted SASB code descriptions, for parent-adolescent communication and T1D self-management.

Code name	Description
<i>Adaptive communication</i>	
(1-2) Affirm/encourage	Parent communication that is supportive and autonomy granting for self-management. E.g. offering encouragement, affirming competence and behaviour.
(1-4) Nurture/protect	Parent communication that is both controlling and warm (behavioural control). E.g. guide, teach, and remind of self-management tasks.
(2-2) Disclose/express	Adolescent communication that is warm and autonomy taking. E.g. express confidence and competence for self-management tasks.
(2-4) Trust/rely	Adolescent communication that is both warm and submissive. E.g. trusting, accept caretaking and reasons, learn, and follow guidance.
(1-2+1-4) Nurture/protect plus, Affirm/encourage	Parent communication that is characterised by warmth. E.g. nurturing, protecting, affirming, and encouraging of self-management.
(2-2+2-4) Disclose/express plus, Trust/rely	Adolescent communication that is characterised by warmth. E.g. disclosing, expressing, trusting and relying.
<i>Maladaptive communication</i>	
(1-6) Blame/punish	Parent communication that is both controlling and conflictual (psychological control). E.g. being overly directive, laying blame and punishment regarding diabetes self-management tasks.
(1-8) Ignore/neglect	Parent communication that is both unsupportive and autonomy granting. E.g. neglecting needs, uncaring, ignoring or neglecting needs of adolescents' diabetes management.
(2-6) Sulk/defend	Adolescent communication that is both submissive and conflictual. E.g. being defensive, sulking, appease or uncomprehendingly agree with parents regarding self-management tasks.
(2-8) Non-disclose/defy	Adolescent communication that is autonomy taking and conflictual. E.g. secrecy, refusing care, avoidance behaviour, being defiant regarding diabetes self-management.
(1-6+1-8) Blame/punish plus Ignore/neglect	Parent communication that is characterised by conflict. E.g. blaming, punishing, ignoring and neglecting.
(2-6+2-8) Sulk/defend plus non-disclose/defy	Adolescent communication that is characterised by conflict. E.g. sulking, appealing, non-disclosing, and being defiant

Appendix D

Table A.

JBI Critical Appraisal Checklist for Analytical Cross Sectional Studies.

Author (year)	1. Were the criteria for inclusion in the sample clearly defined?	2. Were the study subjects and the setting described in detail?	3. Was the exposure measured in a valid and reliable way?	4. Were objective, standard criteria used for measurement of the condition?	5. Were confounding factors identified?	6. Were strategies to deal with confounding factors stated?	7. Were the outcomes measured in a valid and reliable way?	8. Was appropriate statistical analysis used?	Score	Quality
Anderson et al. (2009)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8	Excellent
Berg et al. (2008)	Unclear	Yes	No	Yes	Yes	Yes	Yes	Yes	6	Good
Berg et al. (2008)	Unclear	Unclear	No	Yes	Yes	Yes	Yes	Yes	5	Good
Berg et al. (2011)	Yes	Yes	No	Yes	No	No	Yes	Yes	5	Good
Berg et al. (2013)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8	Excellent
Berg et al. (2017)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8	Excellent
Butler et al. (2007)	Unclear	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	6	Good
Cameron et al. (2008)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8	Excellent
DeBoer et al. (2017)	Yes	Yes	Yes	Yes	No	No	Yes	Yes	6	Good
Drew et al. (2010)	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	7	Excellent
Ellis et al. (2010)	yes	yes	Yes	Yes	Yes	Yes	yes	yes	8	Excellent
Geffken et al. (2008)	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	7	Excellent
Geothals et al. (2016)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8	Excellent

Hillard et al. (2013)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8	Excellent
Lancaster et al. (2015)	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7	Excellent
Landers et al. (2016)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8	Excellent
Main et al. (2014)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8	Excellent
Main et al. (2015)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8	Excellent
Miller & Jawad (2014)	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8	Excellent
Miller et al. (2007)	Yes	Yes	Yes	Yes	No	No	Yes	Unclear	Unclear	5	Good
Mlyanarczyk (2013)	Yes	Yes	Yes	Unclear	No	No	Yes	Unclear	Unclear	4	Acceptable
Osborn et al. (2013)	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	7	Excellent
Palmer et al. (2011)	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	6	Good
Rybak et al. (2017)	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	7	Good
Vaid et al. (2017)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8	Excellent

Table B.

JBI Critical Appraisal Checklist for Cohort Studies.

Author (year)	1. Were the two groups similar and recruited from the same population?	2. Were the exposures measured similarly to assign people to both exposed and unexposed groups?	3. Was the exposure measured in a valid and reliable way?	4. Were confounding factors identified?	5. Were strategies to deal with confounding factors stated?	6. Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	7. Were the outcomes measured in a valid and reliable way?	8. Was the follow up time reported and sufficient to be long enough for outcomes to occur?	9. Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	10. Were strategies to address incomplete follow up utilized?	11. Was appropriate statistical analysis used?	Score	Quality
Grabill et al. (2010)	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9	Excellent
Helgeson et al. (2014)	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Unclear	Yes	9	Excellent
Ingerski et al. (2010)	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9	Excellent
Iskander et al. (2015)	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9	Excellent
Lee et al. (2015)	N/A	N/A	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	8	Excellent
Luyckx et al. (2013)	N/A	N/A	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	7	Good
Miller & Jawad (2017)	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9	Excellent
Rohan et al. (2014)	N/A	N/A	Yes	Yes	No	Yes	Yes	Yes	Yes	Unclear	Yes	7	Good
Seiffge-Krenki et al. (2013)	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9	Excellent
Wu et al. (2014)	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9	Excellent

Table C

JBI Critical Appraisal Checklist for Quasi-Experimental Studies

Study	1. Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	2. Were the participants included in any comparisons similar?	3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	4. Was there a control group?	5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	7. Were the outcomes of participants included in any comparisons measured in the same way?	8. Were outcomes measured in a reliable way?	9. Was appropriate statistical analysis used?	Score	Quality
Monaghan et al. (2015)	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	8	Excellent

Table C.

JBI Critical Appraisal Checklist for Qualitative Research.

Study (year)	1. Is there congruity between the stated philosophical perspective and the research methodology?	2. Is there congruity between the research methodology and the research question or objectives?	3. Is there congruity between the research methodology and the methods used to collect data?	4. Is there congruity between the research methodology and the representation and analysis of data?	5. Is there congruity between the research methodology and the interpretation of results?	6. Is there a statement locating the researcher culturally or theoretically?	7. Is the influence of the researcher on the research, and vice-versa, addressed?	8. Are participants, and their voices, adequately represented?	9. Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	10. Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?	Score	Quality
Babler et al. (2015)	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	8	Good
Carroll et al. (2011)	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	9	Excellent
Dashiff et al. (2011)	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	8	Good
Karlsson et al. (2008)	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	8	Good

Table D.

JBI Critical appraisal checklist for Randomised Controlled Trials.

Author/s (year)	1. Was true randomization used for assignment of participants to treatment groups?	2. Was allocation to treatment groups concealed?	3. Were treatment groups similar at the baseline?	4. Were participants blind to treatment assignment?	5. Were those delivering treatment blind to treatment assignment?	6. Were outcomes assessors blind to treatment assignment?	7. Were treatment groups treated identically other than the intervention of interest?	8. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	9. Were participants analyzed in the groups to which they were randomized?	10. Were outcomes measured in the same way for treatment groups?	11. Were outcomes measured in a reliable way?	12. Was appropriate statistical analysis used?	13. Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel	Score	Quality
Wysocki et al. (2007)	Yes	Unclear	Yes	Unclear	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10	Good

Appendix E.

ommunication findings with diabetes self-maagement outcomes: parents, mothers, fathers, age, and gender – quantitative studies (n = 37)

Communication behaviour	Adherence	Glycaemic control	Self-management / self-efficacy / self-care	Interaction with both parents	Interaction with Mother	Interaction with Father	Time/ Age	Gender	Adaptive / Maladaptive / Both
<i>Warmth</i>									
Warmth		X		X					Adaptive
P-A positive communication	X			X	X		X		Adaptive
P-A lower negative communication	X					X	X		Adaptive
P-A relationship quality	X	X	X	X					Adaptive
P-A interpersonal enjoyment	X				X				Adaptive
P-A agreement		X		X			X		Adaptive
P acceptance	X	X	X	X	X	X		X	Adaptive
A disclosure	X			X	X				Adaptive
P positive tone		X		X					Adaptive
<i>Conflict</i>									
Secrecy	X	X		X	X				Maladaptive
Negative communication	X			X					Maladaptive
Disagreement		X		X					Maladaptive
Conflict	X	X	X	X	X		X		Maladaptive
Low conflict (adaptive)		X		X					Adaptive (-)
Discrepancies in communication frequency		X		X					Maladaptive
<i>Support</i>									
P Autonomy support	X			X			X		Adaptive
Negative parenting (low)	X			X					Maladaptive (+)
A seek, A express & Joint decision-making	X			X					Adaptive
P responsiveness	X			X					Adaptive
P support	X			X					Adaptive
P low support (-)		X		X					Maladaptive (+)
<i>Control</i>									
P coercion	X			X					Maladaptive
P restrictiveness		X		X					Maladaptive
P guidance	X								Adaptive
P persuasion		X	X	X	X	X			Both
P express	X			X					Maladaptive
P firm control			X			X			Maladaptive
P psychological control	X			X					Adaptive
P control	X			X					Maladaptive

