THE INFLUENCE OF PSYCHOSOCIAL AND TREATMENT-RELATED VARIABLES ON ADHERENCE AND METABOLIC CONTROL IN ADOLESCENTS WITH TYPE 1 DIABETES MELLITUS

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BACKGROUND

Achieving adequate metabolic control is crucial in children and adolescents with type 1 diabetes mellitus to prevent immediate and long-term health complications.

Less than half of the children and young adult T1D patients reach the recommendations for optimal glycemic control in Europe and worldwide.

Particularly, the age group 12-22 are challenged by their glycemic control.
The tasks necessary to achieve successful diabetes management is perceived by many patients and caregivers as a huge burden.

Adherence to diabetes treatment a necessary, but not always sufficient, prerequisite for optimal control.

Biological, physiological, and psychosocial factors act as parts of the complex processes that influence metabolic control and adherence in adolescents with T1DM.
INDIVIDUAL AND FAMILY CHARACTERISTICS PREVIOUSLY SHOWN TO AFFECT T1DM TREATMENT

- Older age
- Longer disease duration
- Multiple daily injections versus insulin pump
- Single parent household
- Lower education level of parents
- Lower family income
INDIVIDUAL AND FAMILY CHARACTERISTICS PREVIOUSLY SHOWN TO AFFECT T1DM TREATMENT

- Anxiety and depression
- Diabetes related self-efficacy

- Diabetes related family conflict
- Parental support and non-support
- Parental involvement in responsibilities in diabetes care
- General family functioning
Previous studies:
Relatively small, homogenous groups of participants.
Mostly bivariate correlations

Needed:
Larger studies able to test models reflecting the complexity of factors influencing daily diabetes management, and metabolic control.
Models including a larger number of variables, describing the relative and unique contribution of each
To guide the multidisciplinary clinical care of adolescents with T1DM and development of effective screening and interventions.
THE PRESENT STUDY

Aim:

To investigate possible associations between adherence or metabolic control and patient characteristics, treatment aspects, and psychosocial and psychological variables in all Danish children and adolescents (age 12-17 years) with T1DM
METHODS

All families in the Danish Registry for Childhood and Adolescent Diabetes (DanDiabKids) received a written invitation by post.

The caregiver primarily involved with the diabetes-related care of the child/adolescent was requested to complete the survey.

Also the adolescent completed the survey

All families were asked to provide a blood sample from the child for HbA$_{1c}$ analysis.
All families (N = 1075) with an adolescent age 12-17 with a diagnosis of T1DM were invited

386 declined or did not respond

689 families included

519 adolescent completed the survey without missings

531 caregivers completed the survey without missings
MEASURES

Adherence

• Adherence in Diabetes Questionnaire (ADQ)

Family factors

• Diabetes Family Behavior Checklist
  • Parental support and non-support

• Diabetes Family Conflict Scale
  • Diabetes-related family conflict

• Diabetes Family Responsibility Questionnaire
  • The division of responsibility in relation to regimen tasks, general health maintenance, and social presentation of diabetes

• Family Assessment Device
  • The General Functioning subscale
Social and emotional difficulties of the adolescent

- **Youth:** depression (BDI) and anxiety (BAI) subscales of the Beck’s Youth Inventories
- **Caregiver:** Strength and Difficulties Questionnaire

Self-efficacy

- **Youth:** Self-Efficacy for Diabetes Self-Management
Medical and sociodemographic information

- Diabetes duration (provided by DanDiabKids)
- Family structure,
- Caregiver education level
- Household income
- Adolescent’s current diabetes treatment.
# Participant Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Percentage or mean (standard deviation)</th>
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<tbody>
<tr>
<td>Age of participating adolescents, years</td>
<td>14.6 (1.6)</td>
</tr>
<tr>
<td>HbA1c, %</td>
<td>8.25 (1.25)</td>
</tr>
<tr>
<td>Diabetes duration, years</td>
<td>6.07 (3.47)</td>
</tr>
<tr>
<td>Participants using insulin pump</td>
<td>37.8</td>
</tr>
<tr>
<td>Living with parents who are no longer together</td>
<td>20.8</td>
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<tr>
<td>Danish primary language at home</td>
<td>98.7</td>
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RESPONDERS VERSUS NON-RESPONDERS

Age = no difference

Duration = longer for non-participants

Metabolic control = worse for non-participants

27% of participating adolescents met the recommended HbA1c level (< 7.5%/58 mmol/mol).
Bivariate correlations between all included variables were examined, mostly confirming previous studies.
PATH MODELING

Two structural equation models for adolescents and parents of associations between adherence and metabolic control and diabetes-related family conflict, supportive and non-supportive caregiver behavior, responsibility for diabetes-related tasks, general family functioning, self-efficacy (only in the adolescent model), social and emotional difficulties of the adolescent including the possible mediational role of adherence. Demographic variables were included as covariates.
For adolescents, model fit was satisfactory

\[ \chi^2(2) = 3.19, p = 0.20, \text{CFI}=0.997, \text{TLI}=0.955, \text{SRMR}=0.004, \text{RMSEA}=0.034 \]

For caregivers, model fit was satisfactory

\[ \chi^2(2) = 1.78, p = 0.41, \text{CFI}=1.000, \text{TLI}=1.008, \text{SRMR}=0.003, \text{RMSEA}=0.000 \]
PATH MODEL - ADOLESCENTS

Better adherence:

- Less diabetes related conflict
- More supportive caregiver behaviour
- Better family functioning
- Higher self-efficacy
- Less depression
- More anxiety
PATH MODEL - ADOLESCENTS

Better adherence:

Using insulin pump
Lower age
Lower duration

Conflicts, non-supportive, supportive, responsibility, family functioning, self-efficacy, depression, anxiety, adherence, HbA1c, duration, pump, age, boy, further education, one parent, left home, vocational, further, education, left home.
Adherence fully mediated the relationship between metabolic control and:

- Diabetes-related family conflict
- Supportive caregiver behavior
- Self-efficacy
PATH MODEL - ADOLESCENTS

Poorer metabolic control:

- More non-supportive caregiver behaviour
- Poorer adherence
- Less anxiety
Poorer metabolic control:

- Longer duration
- Multiple daily injections
- One parent home
Model accounted for 25% of the variance in metabolic control and 51% of the variance in adherence.

**Metabolic control** had the strongest association with **adherence** ($r = -0.21$), and **symptoms of anxiety** ($r = -0.17$),

**Adherence** had the strongest association with **self-efficacy** ($r = 0.44$) and **symptoms of anxiety** ($r = 0.23$)
Better adherence:

Less conflict
Less non-supportive caregiver behaviour
More youth responsibly for diabetes related tasks
More supportive caregiver behaviour
Fewer social and emotional difficulties
Adherence fully mediated the relationship between metabolic control and:

- Non-supportive caregiver behavior
- Social and emotional difficulties
PATH MODEL - CAREGIVERS

Better adherence:

- Lower age
- Being male
- Shorter duration
- Using insulin pump
PATH MODEL - CAREGIVERS

Poorer metabolic control:

- Higher diabetes related conflict
- Less supportive caregiver behaviour
- Poorer adherence
PATH MODEL - CAREGIVERS

Poorer metabolic control:

- Higher age
- Longer diabetes duration
Caregiver path model accounted for 26% of the variance in HbA1c and 49% of the variance in adherence.

Metabolic control had the strongest association with adherence ($r = -0.24$), and diabetes-related family conflict ($r = 0.22$)

Adherence had the strongest association with parental non-support ($r = -0.30$) and parental assessment of the social and emotional difficulties of the adolescent ($r = -0.20$)
LIMITATIONS

cross-sectional design

• No causal or bidirectional explanations

Non-participants worse metabolic control than participants
CLINICAL IMPLICATIONS

Increasing adolescent diabetes-related self-efficacy
May improve adherence → improve regulation

monitoring and improving the emotional well-being of adolescents

Helping the family to manage diabetes together. Parents also important in adolescence → adherence → regulation
Questions?

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