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Title: Development of the Diabetes Treatment Satisfaction Questionnaire (DTSQ) for Teenagers and Parents: the DTSQ-Teen and the DTSQ-Parent.

Background and Aims: To report psychometric development of the DTSQ-Teen and -Parent, designed by Woodcock et al (2007) from the adult DTSQ using qualitative interviews with 14 teenagers with diabetes and 32 parents of children with diabetes. To compare the views of teenagers and their parents.

Materials and Methods: The 12-item Diabetes Treatment Satisfaction Questionnaire for Teens (DTSQ-Teen) and the 13-item questionnaire for Parents (DTSQ-Parent) were completed by 38 adolescent offspring (aged 12-17 years) and 91 parents participating in a study by Pacaud et al (who provided baseline data from their study for questionnaire development). Non-parametric tests were used when Kolmogorov-Smirnoff test indicated data not normally distributed. All probabilities are 2-tailed.

Results: All 13 items on the DTSQ-Parent, except *perceived frequency (p. freq) of hyper- and hypoglycaemia*, had loadings from between 0.509 and 0.746 on a forced one-factor solution of a principal components analysis. Cronbach's alpha=0.787. Ten items retained for the new Treatment Satisfaction-Parent subscale (TS-Parent) were: *satisfied, ease, flexibility, day treatment, liked activities, family life, understanding, low discomfort, medical support, continue treatment*; alpha=0.801. With the 12-item DTSQ-Teen (items as in the DTSQ-Parent, except *family life* which teens do not view as affected by diabetes), factor loadings for all items except *p. freq of hypoglycaemia* and *low discomfort* were between 0.497 and 0.870 on a forced one-factor solution. When the *p. freq hyper- and hypoglycaemia* and *control* items were removed for comparability with the TS-Parent, alpha improved from 0.769 to 0.832, and to 0.856 when *low discomfort* was removed. A 2-item subscale, reflecting Perceived Diabetes Control (PDC), emerged from unforced factor analyses extracting factors with eigenvalues >1. Loadings were 0.820 and 0.722 (Parent) and 0.809 and 0.864 (Teen) for *p. freq of hyperglycaemia* and the *control* item. Alphas=0.567 (PDC-Parent) and 0.768 (PDC-Teen).

Comparison of parent and teen ratings on DTSQ items, the PDC and the TS subscales indicated moderate agreement: Bivariate correlations between parent and teen ratings were significant for 6 of 12 items ($p < 0.05$, r ranging from 0.38 to 0.67), and for each total subscale score (PDC Spearman's $r = 0.63$, $p < 0.01$; TS $r = 0.36$, $p < 0.05$). Differences between parent and teen

ratings on the PDC scale were significant: mean % parent=55.3, teen=62.2 (Wilcoxon matched-pairs signed-ranks $p < 0.025$). On individual items, parents over-estimated discomfort compared to their offspring (means on 0-6 low discomfort scale: parent=4.18, teen=4.99 (Wilcoxon $p < 0.01$) and assessed diabetes as less well controlled (means on 0-6 scale: parent=3.93, teen=4.38, Wilcoxon $p < 0.05$).

Conclusion. The DTSQ-Teen and DTSQ-Parent instruments include subscales to measure diabetes treatment satisfaction which have clear structures and excellent internal consistency reliability in addition to content validity previously demonstrated. *P. frequency of hypoglycaemia* is treated as a single item. Analyses confirmed the importance of examining the teens' reports, since these did not always relate closely to the parents' reports, differing significantly from them on PDC scale, and on two individual items. Both the TS and PDC measures are likely to be useful outcome measures in clinical trials of diabetes treatments for children and teenagers.