# Supplemental Table 2. Study Characteristics and Results (*complete data of all included studies*)

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|  | ***Study characteristics*** | | | | | | |
|  | **Study design** | **Participants** | **Methods** | **Definition of constipation / FI / (F)NRFI** | **Outcome measure** | **Population of children with functional defecation disorders** | **Control group** |
| **Rajindrajith et al. (2010)(40)** | Cross-sectional | 2686 children aged 10-16 y (13.2±1.7)  50.7% male | School-based, island-wide study in Sri Lanka. Random selection of provinces, schools and classes. Validated, self-administered questionnaire. No (rectal) examinations performed.  Data were analysed using chi2 and Fisher’s exact tests. Multiple logistic regression analysis was performed on variables that were found to have significant association. | ROME III criteria / Defecation into places inappropriate to the social context, at least once per month, for a minimum period of 2 months / ROME III criteria | Prevalence of constipation associated and non retentive fecal incontinence and associated factors. | 55 children with FI (11.96±1.59y) 78.2% male.  81.8% of children with constipation-associated FI, 18.2% with non-retentive FI. | 2631 children without FI, mean age not presented, 50.1% male |
| **Devanarayana et al. (2010)(41)** | Cross-sectional | 2699 children aged 10-16 y (13.17±1.72) 50.6% male | School-based, island-wide study in Sri Lanka. Random selection of provinces and schools. Validated, self-administered questionnaire. No physical examination performed.  Data were analysed using chi2 and Fisher’s exact tests. Multiple logistic regression analysis was performed on variables that were found to have significant association. | ROME III criteria / - / - | Association between constipation and stressful life events. | 416 children with constipation (12.74±1.72y) 55.3% male | 2283 children without constipation (13.2±1.7y) 49.8% male |
| **Inan et al. (2007)(39)** | Cross-sectional | 1689 children aged 7-12 y (9.23±1.2) 50.8% male | School-based population in Edirne, Turkey. Randomly selected from class lists. Self-administered questionnaire by parents and children. No physical examination performed. Data were analysed using chi2 and Fisher’s exact tests. To determine the potential risk factors of constipation, a logistic regression model was built. | NASPGHAN criteria / - / - | Prevalence of constipation and associated factors. | 122 children with constipation, mean age not presented, 50.8% male | 1567 children without constipation, mean age not presented, 48.8% male |
| **Joinson et al. (2006)(43)** | Cross-sectional | 8238 children aged 7y7m, mean age and boy-girl ratio not presented | The Avon Longitudinal Study of Parents and Children (ALSPAC) population-based cohort. Interviews and questionnaires. No physical examination performed. Data were analysed using chi2 tests. A multivariable analysis was performed to determine which emotional and behaviour problems were associated with soiling. Adjustments were made for the effect of confounding variables, including developmental delay, gender, stressful life events, and family sociodemographic background. Missing data were excluded from the multivariable models. In the final adjusted estimates, a missing data imputation technique was used known as “ice” to correct for any bias caused by dropout. | -/ Repeated passage of feces in inappropriate places, with a frequency of at least once a month for 3 months in children aged ≥4 years and in the absence of a physical cause / - | Prevalence of psychological, emotional and behavioral problems, self-esteem, bullying and friendships in children who soil compared with children who do not soil. | 565 children with FI , mean age and boy-girl ratio not presented.  117 children with frequent FI (≥1/week), mean age not presented, 69% male.  448 children with less frequent FI (<1/week), mean age not presented, 64% male  Constipation during the last 12 months in 46.4% of children soiling ≥2/week, 31.3% of those soiling 1/week, and 19.4% of those soiling <1/week. | 7673 children without FI, mean age not presented, 50% male |
| **Van der Wal et al. (2005)(46)** | Cross-sectional | 18456 children aged 5-6 y, 16293 children aged 11-12 y, mean age and boy-girl ratio not presented | Children attended school health care centres for routine medical checks in Amsterdam, The Netherlands. Parent questionnaire filled out by school doctors, child health care findings and action register. Data were analysed using chi2 tests. A logistical regression was performed to determine the association of each sociodemographic characteristic to the prevalence of encopresis. Adjustments were made for the effect of confounding variables, including child’s age, gender, the number of children living at home, ethnic origin of the family, and the postal code. | -/ Involuntary loss of feces in the underwear once a month or more. / - | Prevalence of encopresis and associated psychosocial problems | 4.1% of children aged 5-6 y with FI, accurate numbers, mean age and boy-girl ratio not presented.  1.6% of children aged 11-12 y with FI, accurate numbers, mean age and boy-girl ratio not presented.  Overall, FI was found in 3.7% of boys and in 2.4% of girls. | Unknown |
| **Fishman et al. (2002)(45)** | Cross-sectional | 411 children aged 4-17 y (8.75±3.5) boy-girl ratio not presented | Children referred to the Pains and Incontinence Program at Children’s Hospital in Boston. Detailed parent questionnaire. Full medical history and physical examination performed. Parametric variables were compared using the t-test, and categorical variables were compared using chi2 tests. | Hard stools or difficulty in defecation sufficient to cause significant distress according to the parents’ perception / Repeated passage of feces into inappropriate places (such as underwear or pajamas), whether involuntary or intentional, after the age of 4 years / - | Prevalence of predisposing factors that occurred in the first 2 years of life and around toilet training associated with childhood encopresis. | 411 children with FI (8.75±3.5y) boy-girl ratio not presented.  192 children with primary FI (8.42±3.33y) 72.4% male.  177 children with secondary FI (9.17±3.08y) 78.5% male. Number of constipation-associated FI not given. | - |
| **Roma-Giannikou et al. (1999)(42)** | Cross-sectional | 1932 children aged 2-14 y, mean age and boy-girl ratio not presented | A random stratified sample from 3 counties of Greece. Interviews from parents and children. Physical examination of constipated children, including anal and rectal examination. Data were analysed using chi2 tests. | 3 or less bowel movements per week, or hard stools with painful defecation (even with more than 3 bowel movements per week) at least for the last 2 months / - / - | Prevalence of constipation, the relations to socioeconomic factors and clinical presentation. | 116 children with constipation (7.5±3.17y), 52% male | 1816 children without constipation, mean age and boy-girl ratio not presented |
| **Levine (1975)(44)** | Cross-sectional | 102 children aged 4-13 y (7.33, SD n/a) 85.3% male | Pediatric outpatient clinic in Boston, USA. Interviews and questionnaires. Physical including rectal examination performed.  No statistical analysis performed. | -/ Any child over 4 years of age who regularly passed (semi)formed or liquid stools into his underwear or pyjamas with no apparent primary organic etiology/ - | Encopresis associated clusters of demographic, social, and training factors. | 102 children with FI (7.33, SD n/a), 85.3% male.  40 children with primary FI (6.25y, SD n/a) 85.1% male.  62 children with secondary FI (8.0y, SD n/a) 85.5% male. 79.4% stool impaction at first visit. | - |

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|  | ***Results*** | | | | | | | | | |
|  | **Overall prevalence of abuse** | **Overall prevalence of stressful life events** | **Prevalence of different types of stressful life events** | | | | | | | |
|  |  |  | *Change in school* | *Suspension from school* | *Frequent punishment in school* | *Failure in examination* | *Separation from best friend* | *Being bullied (victim)* | *Overt bully* | *Relational victim* |
| **Rajindrajith et al. (2010)(40)** | - | 90.9% (adjusted OR 4.94, 95% CI 1.76-13.88, *p*=0.002) during the previous 3 months\*\*\*1 | N=13 (23.6%)\* | N=2 (3.6%)\* | N=14 (25.5%)\* | N=15 (27.3%)\* | N=18 (32.7%) | N=18 (32.7%) (adjusted OR 2.57, 95% CI 1.19-5.52, *p*=0.016)\*\*\* | - | - |
| **Devanarayana et al. (2010)(41)** | - | 82.2% (OR 2.52 95% CI 1.92-3.31, *p*=<0.001) during the previous 3 months\* 2 | N=59 (1  4.2%)\* | N=4 (1%) | N=53 (12.7%)\* | N=82 (19.7%) (adjusted OR 1.43, *p*=0.03)\*\*\* | N=133 (32%) (adjusted OR 1.35, *p*=0.017)\*\*\* | N=54 (13%) (OR 2.51, 95% CI 1.77-3.56, *p*<0.00001)\* | - | - |
| **Inan et al. (2007)(39)** | - | *Physical or psychological trauma* in 38.8% (logistic regression analysis: OR 1.9 95% CI 1.13-3.42, *p*=0.016)\*\*3 | - | - | - | - | - | - | - | - |
| **Joinson et al. (2006)(43)** | - | - | - | - | - | - | - | N=29 (42.0%) of children who soil ≥1/week (unadjusted OR 1.43, 95% CI 0.88-2.31, adjusted OR1 1.39, 95% CI 0.86-2.25, adjusted OR2 1.20, 95% CI 0.73-1.97), N=124 (40.1%) of children who soil <1/week (unadjusted OR 1.32, 95% CI 1.04-1.67, adjusted OR1 1.31, 95% CI 1.04-1.66, adjusted OR2 1.26, 95% CI 0.99-1.59)4 | N=9 (18.4%) of children who soil ≥1/week (unadjusted OR 2.39, 95% CI 1.15-4.97, adjusted OR1 2.39, 95% CI 1.15-4.96, adjusted OR2 1.75, 95% CI 0.82-3.77), N=35 (15.9%) of children who soil <1/week (unadjusted OR 2.01, 95% CI 1.38-2.93, adjusted OR1 2.01, 95% CI 1.37-2.93, adjusted OR2 1.86, 95% CI 1.26-2.75)4 | N=15 (21.1%) of children who soil ≥1/week (unadjusted OR 1.46, 95% CI 0.82-2.59, adjusted OR1 1.44, 95% CI 0.81-2.56, adjusted OR2 1.48, 95% CI 0.83-2.64), N=61 (19.9%) of children who soil <1/week (unadjusted OR 1.35, 95% CI 1.01-1.80, adjusted OR1 1.34, 95% CI 1.01-1.80, adjusted OR2 1.39, 95% CI 1.04-1.86)4 |
| **Van der Wal et al. (2005)(46)** | 0.7% (adjusted OR 4.32, 95% CI 1.68-11.1, *p*<0.01)\*\*\*\* | - | - | - | - | - | - | - | - | - |
| **Fishman et al. (2002)(45)** | - | - | - | - | - | - | - | - | - | - |
| **Roma- Giannikou et al. (1999)(42)** | - | *Life events correlated with the onset of constipation in 1.6% of the cases*5 | - | - | - | - | - | - |  | - |
| **Levine (1975)(44)** | - | *Onset of the child’s secondary fecal**incontinence coincided with a disruptive occurrence* *in* 44%6 | - | - | - | - | - | - | - | - |
|  | **Prevalence of different types of stressful life events** | | | | | | | | | |

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|  | *Severe illness in a close family member* | *Death of a close family member* | *Loss of job by parent or unemployment* | *Interruption of toilet training* | *Birth of a sibling* | *Frequent domestic fights* | *Frequent punishment by the parents* | *Father’s alcoholism* | *Divorce or separation of parents* | *Remarriage of a parent* | *Hospitalization of the child for other illness* | *Living in a war affected area* |
| **Rajindrajith et al. (2010)(40)** | N=20 (36.3%)\* | N=8 (14.5) | N=5 (9.1%)\* | - | N=13 (23.6%)\* | N=7 (12.7%)\* | N=14 (25.5%)\* | N=7 (12.7%)\* | N=3 (5.5%)\* | - | N=21 (38.1%) (adjusted OR 2.74, 95% CI 1.32-5.69, *p*=0.007)\*\*\* | - |
| **Devanarayana et al. (2010)(41)** | N=106 (25.5%) (adjusted OR 1.64, *p*=0.001)\*\*\* | N=58 (13.9%)\* | N=30 (7.2%) (adjusted OR 1.84, *p*=0.016)\*\*\* | - | N=57 (13.7%)\* | N=20 (4.8%)\* | N=65 (15.6%) (adjusted OR 1.77, *p*=0.003)\*\*\* | N=31 (7.5%)\* | N=8 (1.9%) | N=8 (1.9%)\* | N=74 (17.8%)\* | N=195 (46.8%) (adjusted OR 1.48, *p*=0.001)\*\*\* |
| **Inan et al. (2007)(39)** | - | - | - | - | - | - | - | - | - | - | - | - |
| **Joinson et al. (2006)(43)** | - | - | - | - | - | - | - | - | - | - | - | - |
| **Van der Wal et al. (2005)(46)** | - | - | - | - | - | - | - | - | - | - | - | - |
| **Fishman et al (2002)(45)** | - | - | - | N=136 (38%) of all children. N=87 (50%) of 192 children with primary FI and N=38 (24%) of 177 with secondary FI, *p*=0.0001\* | (during toilet training) N=109 (28%) of all children. N=54 (29%) of 192 children with primary FI and N=46 (27%) of 177 with secondary FI | - | (during toilet training) N=142 (38%) of all children. N=95 (52%) of 192 children with primary FI and N=41 (25%) of 177 with secondary FI, *p*=0.0001\* | - | - | - | - | - |
| **Roma- Giannikou et al. (1999)(42)** | - | - | - | - | - | - | - | - | - | - | - | - |
| **Levine (1975)(44)** | - | N=14 (35%) of children with secondary FI | N=23 (22.5%) families on welfare or principal wage earner unemployed  Primary FI: N=2 (5%)  Secondary FI: N=21 (34%) | - | N=4 (10%) of children with secondary FI | - | - | - | N=34 (33.3%) Primary FI: N=10 (25%)  Secondary FI: N=24 (39%) | - | - | - |

*\* statistically significant (p-value <.05)*

*\*\* remained significant after logistic regression analysis*

*\*\*\* remained significant after multiple logistic regression analysis*

*\*\*\*\* remained significant after logistic regression analysis with correction for the child’s age, gender, the number of children living at home, ethnic origin of the family, and the postal code*

*1This comprises change in school, suspension from school, frequent punishment in school, separation from best friend, sitting in government examination, failure in examination, being bullied at school, severe illness in a close family member, death of a close family member, loss of job by parent, birth of a sibling, frequent domestic fights, frequent punishment by the parents, father’s alcoholism, divorce or separation of parents, and hospitalization of the child*

*2 This covers all stressful life events given at †, supplemented by remarriage of parent and living in a war affected area*

*3 This covers experiences of traffic accident, major trauma, earthquake, flood, fire, death ofrelatives, and change in school or teacher*

*4Adjusted OR1 is adjusted for developmental delay, adjusted OR2 is adjusted for developmental delay, gender, sociodemographic background (home ownership, car ownership, crowding, mother’s education, mother’s age, parity, and marital status) and stressful life events*

*5This covers experiences of death or separation from a family member*

*6Associated events: loss of a parent N=14 (23%), traumatic entry into school N=9 (15%) or birth of a younger sibling N=4 (6%)*