

# A first hypothetical estimate of the Dutch burden of disease with respect to negative experiences during childhood

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**On request of Augeo foundation, TNO Quality of Life examined whether the Adverse Childhood Experience (ACE) questionnaire of Felitti et al. (1998) can also be used in the Netherlands. The questionnaire was translated and data were collected in a representative sample of approximately 2,200 respondents from the Dutch population, partly by internet and partly by a mail survey.**

**First, we assessed whether it was allowed to sum the scores on the individual ACE items and whether the resulting sum score could indeed be used as a scale in the Dutch population, as Felitti et al. did in the USA. Second, we determined the percentages of positive answers to the individual items and the distribution of the number of ACE categories, and we compared these to those in the USA. Third, we obtained a first hypothetical estimate of the Dutch burden of disease in relation to number of ACE categories.**

## *Assessment of the scale structure: can the answers on individual items be expressed on one single scale, measuring ACE?*

The Dutch ACE questionnaire measures one strong dimension, which can be defined as Adverse Childhood Experiences (ACEs). The internal consistency of the scale is high. It is also possible to compute scores on five meaningful subscales: physical and emotional individual abuse, family member abuse, household issues, sexual individual abuse, and physical neglect.

## *What is the distribution of ACE in the Netherlands?*

The ACE questionnaire consists of 17 items that can be answered with a Yes or No. These items are combined into ten ACE categories in a certain way (see Table 1). Table 1 presents the percentages of positive answers to the ACE items and the ACE categories. The percentages are weighted in order to be representative for the Netherlands. Events mentioned most frequently are Emotional Neglect, Emotional Abuse and Physical Abuse.

The scores on the ten ACE categories (1=Yes, 0=No) were summed, resulting in an ACE sum score. This score represents the number of ACE categories experienced in childhood and ranges from 0 (no adverse childhood experiences) to 10 (ten adverse childhood experiences). For example, when respondents reported in total three ACE categories, their ACE score is three. Figure 1 presents the distribution of the ACE sum score in the Dutch population. Although the majority of respondents (56%) did not report any adverse childhood event, a considerable percentage (44%) reported at least one. Approximately one out of four respondents reported one or two types of adverse childhood experiences and one out of ten respondents reported four or more.

Table 1: The percentages of positive answers to the ACE items and ACE categories in the Netherlands.

	ACE item	ACE category
<b>1. Emotional Abuse: Did a parent or other adult in the household often or very often...</b>	18	
a. Swear at you, insult you, put you down, or humiliate you?		
b. Act in a way that made you afraid that you might be physically hurt?	9	
Total: a or b is answered with yes		19
<b>2. Physical Abuse: Did a parent or other adult in the household often or very often...</b>	14	
a. Push, grab, slap, or throw something at you?		
b. Ever hit you so hard that you had marks or were injured?	10	
Total: a or b is answered with yes		17
<b>3. Sexual Abuse: Did an adult or person at least 5 years older than you ever...</b>	10	
a. Touch or fondle you or have you touch their body in a sexual way?		
b. Attempt or actually have oral, anal, or vaginal intercourse with you?	4	
Total: a or b is answered with yes		10
<b>4. Emotional Neglect: Did you often or very often feel that ...</b>	14	
a. No one in your family loved you or thought you were important or special?		
b. Your family didn't look out for each other, feel close to each other, or support each other?	16	
Total: a or b is answered with yes		21
<b>5. Physical Neglect: Did you often or very often feel that ...</b>	3	
a. You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?		
b. Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?	2	
Total: a or b is answered with yes		5
<b>6. Parental Separation or Divorce: Were your parents ever separated or divorced?</b>	15	15
<b>7. Mother treated violently: Was your mother or stepmother:</b>	7	
a. Often or very often pushed, grabbed, slapped, or had something thrown at her?		
b. Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard?	4	
c. Ever repeatedly hit at least a few minutes or threatened with a gun or knife?	3	
Total: a or b is answered with yes		8
<b>8. Household Substance Abuse: Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?</b>	8	8
<b>9. Household Mental Illness: Was a household member depressed or mentally ill, or did a household member attempt suicide?</b>	10	10
<b>10. Incarcerated Household Member: Did a household member go to prison?</b>	2	2

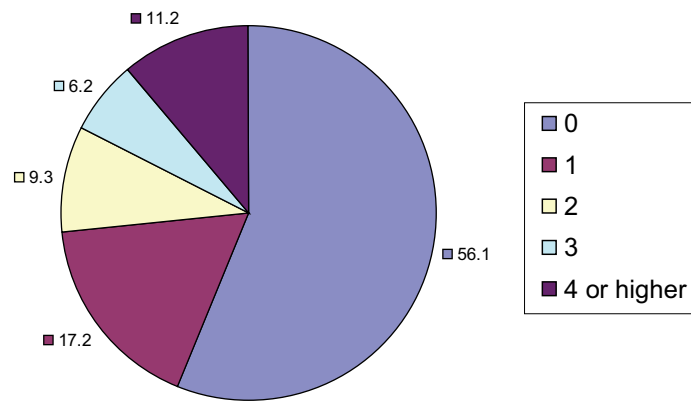


Figure 1: Distribution of the ACE sum score in the Netherlands. The ACE sum score represents the number of ACE categories.

Table 2 compares the percentages of positive answers (i.e. prevalences) to the separate ACE categories for the Dutch respondents who reported in total one ACE category and for those who reported in total two ACE categories. It may be concluded from this table that when emotional abuse is reported, it is often reported together with some other ACE category, namely in 39% of the cases versus the overall average of 19%. Emotional abuse is less likely to be reported alone, namely 9% versus 19%. The other figures can be interpreted analogously.

Table 2: The Dutch prevalences of the ACE categories in general, for those with an ACE score of one, and those with an ACE score of two

ACE category	ACE score of		
	General	1	2
1. Emotional Abuse	19	9	39
2. Physical Abuse	17	15	35
3. Sexual Abuse	10	16	22
4. Emotional Neglect	21	18	37
5. Physical Neglect	5	1	3
6. Parental Separation or Divorce	15	23	23
7. Mother treated violently	8	2	9
8. Household Substance Abuse	8	6	13
9. Household Mental Illness	10	11	16
10. Incarcerated Household Member	2	0	4

## Do the ACE scores of the Netherlands differ from those of America?

Table 3 displays the prevalence of each ACE score in both the Netherlands and America. ACE scores of four or higher are combined. The differences between the two distributions, overall and for each single ACE score, are significant, except for an ACE score of four or higher. This means that the prevalence of an ACE score of four or higher is equal in the Dutch and American population. Relatively more Dutch respondents (56%) reported no adverse childhood experiences at all compared to the American sample (36%). Furthermore, less Dutch respondents reported one, two, or three adverse childhood experiences (see Table 3).

Table 3: Prevalences of ACE scores for the Netherlands (NL) and for America (USA)

ACE score	NL	USA
0	56%	36%
1	17%	26%
2	9%	16%
3	6%	10%
4 or higher	11%	13%

These differences may reflect real differences in the prevalence of adverse childhood experiences. Other factors may, however, play a role too:

- Culture-/country-differences in
  - the definitions and interpretation by the respondents (e.g., when does one say someone is swearing).
  - admitting to have experienced an adverse childhood event (e.g., in the Netherlands you might easier say to experience physical abuse and in America you might easier admit you have an alcohol problem).
- Sample differences: the American data set contains only persons who belong to the middle class (Felitti et al., 1998) and the Dutch data set contains persons from the whole population.

## Are there differences in the distribution of the ACE sum score related to demographic characteristics?

We examined the differences in the distribution of the ACE sum score for each category of a demographic characteristic. We evaluated this for gender, age, region, education, and size of household. We found the following significant differences:

- Women have on average a higher ACE score than men.
- The persons in age category 18-24 have on average a lower ACE score than those in the sequential category 25-34. Similarly, the persons in age category 65+ have on average a lower ACE score than those in the sequential category 55-64. This might indicate that, comparable to what Felitti et al. (1998) suggests, there are less high ACE scores in the 65+ category, because those with a high ACE score die before their 65th birthday.
- Persons who live in the North have on average a lower ACE score than persons who live in the big cities of the Netherlands. All the other combinations of regions do not differ significantly in ACE score.
- Persons with a higher education have on average a lower ACE score than person with an average education.

## Hypothetical: What is the burden of disease of the Netherlands?

The data collection did not include measures on risk factors and/or disease conditions, in contrast to the study of Felitti et al. (1998). The odds ratios found in their study, the distribution of the ACE sum score in our study, and the prevalences of the conditions in the Netherlands can be used to estimate the burden of disease in the Netherlands related to

adverse childhood events. This estimation is, however, hypothetical and depends on the degree to which the following assumptions are met:

- The study sample of Felitti et al. is comparable to ours – which clearly is not true: The American sample is mainly middle class, whereas the Dutch sample is more representative for the total population in the Netherlands.
- The association between ACE sum score and burden of disease in the Netherlands is comparable to that in the USA, which we do not know.
- The definition of the medical condition as assessed in the USA is comparable to the definition in the Netherlands – which, at least for several health problems, is not the case.

This estimate of the burden of disease should therefore be used very carefully. Definite answers can only be given based on a new data collection, which involves the collection of ACE items and health problems. The hypothetical prevalence of several health problems in relation to the ACE sum score distribution in the Dutch population are given in Tables 4 and 5.

Table 4 summarizes the disease burden in the Netherlands relative to the number of persons with a certain ACE score. The table presents the prevalence of each medical condition or risk factor per ACE score. If our assumptions are valid, it would mean that 40% of the persons with an ACE score of four or higher smokes, while the overall prevalence of smoking is 27% in the Netherlands. Similarly, 16% of the people with an ACE score of four or higher has a depressed mood, whereas the overall prevalence is 6%. The analogue holds for the other health problems.

*Table 4: A hypothetical estimate of percentages of people with a certain ACE score having certain health problems with respect to the number of persons within a certain ACE score*

ACE score	Risk factors						Disease conditions	
	smoking	severe obesity	physical inactivity	depressed mood	alcoholism	cannabis use	COPD	diabetes
	%	%	%	%	%	%	%	%
0	23	11	40	4	5	11	1	4
1	25	12	44	6	10	17	2	4
2	31	14	44	9	18	25	2	3
3	38	14	48	10	21	30	3	4
4 or higher	40	16	46	16	29	36	5	6
Reference	27	12	42	6	11	17	2	4

Based on the same assumptions we could calculate the distribution of risk factors and medical conditions by ACE scores (Table 5). Most people with such conditions can be found among people with an ACE score of 0. This can be expected as the group of people with an ACE score of 0 is by far the largest group. The table, however, also shows that the relatively small group of people with an ACE score of four or higher contains more than 25% of all people with depressed mood, alcoholism and COPD. Assuming some causal relationships, this could imply that, when adverse childhood experiences would be treated effectively, the number of people with depressed mood or alcoholism could drop significantly (see also Figures 2 and 3).

Table 5: A hypothetical estimate of distribution of medical conditions by ACE score

ACE score	Risk factors						Disease conditions	
	smoking	severe obesity	physical inactivity	depressed mood	alcoholism	cannabis use	COPD	diabetes
	%	%	%	%	%	%	%	%
0	48	50	53	34	27	35	36	53
1	16	17	18	16	16	17	18	16
2	11	11	10	13	16	14	9	8
3	9	7	7	10	12	11	9	7
4 or higher	17	15	12	28	30	24	27	17
Total	100	100	100	100	100	100	100	100

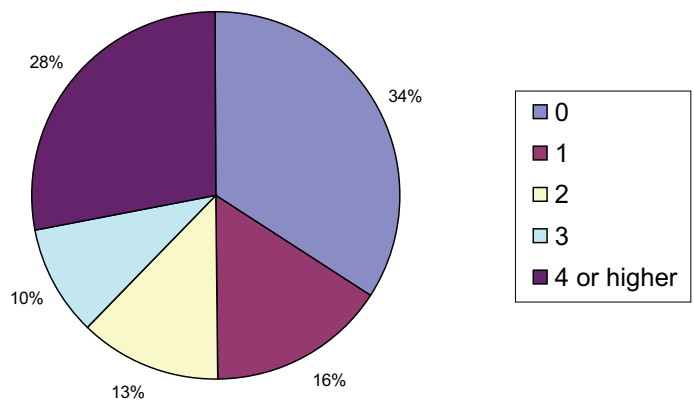


Figure 2: The hypothetical distribution of depressed mood in relation to ACE sum score

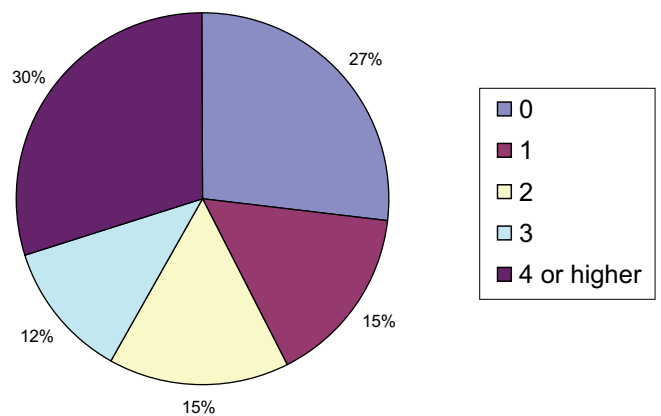


Figure 3: The hypothetical distribution of alcoholism in relation to ACE sum score