



Original research article

## Kids and Kilowatts: Socialisation, energy efficiency, and electricity consumption in New Zealand

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## ABSTRACT

Socialisation into electricity consumption usually occurs during childhood, but little is known about the socialisation processes involved. Here, we use interviews and focus groups to investigate how nine to ten-year-old children from New Zealand learn about, and consume, electricity in their homes. The children used a wide range of electrical appliances and engaged in different energy saving behaviours, often without being conscious of their implications. Control over appliances and learning through modelling, reminders and rules helped to socialise children into saving electricity, while nagging and inconsistent behaviours from parents were counterproductive. Conversations about energy were uncommon, but helpful for creating consciousness about energy use. We discuss the need for a more structured approach, through developing energy literacy, in order for children to use their agency, surpass their parents' level of energy saving practices, and stabilise energy saving behaviours through life. In addition, we provide recommendations on how parents, schools, the media and product developers can help in this process.

### 1. Introduction

Energy efficiency holds major benefits for energy security, economic growth and the environment, and could halve the growth in primary energy demand by 2035 [1]. Improving energy efficiency requires a multi-pronged approach involving both technological improvements and adjustments in end-user behaviours [2]. Understanding behaviour is crucial in facilitating the adoption and proper use of energy efficient technologies, as well as encouraging people to diminish their overall energy consumption and reduce the number of appliances they own [3,4]. Energy-using practices start in childhood, and despite the many studies investigating energy behaviour [5,6], relatively few have investigated how energy saving practices initially develop. This is unfortunate, since it is generally during childhood that socialisation into electricity use occurs [7]: although adolescents tend to lose interest in conserving power [8,9], expectations and practices acquired at home during childhood are often carried through into adulthood [7,10].

Research on children and energy has mostly focused on the role of schools in developing energy literacy: a state of knowing, caring, and taking responsibility for the effects of energy production and consumption [11]. However, engaging in environmental practices, such as

conserving electricity, is not always a conscious decision based on knowledge and corresponding attitudes [6,12]. Instead, energy saving practices tend to be the product of poorly understood “repetitive, unconscious, routine aspects of household energy consumption” [3, p. 449], as well as – in the case of children – learning processes guided by parents [13].

Childhood learning experiences can be understood as socialisation, which teaches young people “the necessary skills, values, and behavioural patterns to become well-functioning members of their social group(s) and the culture in which they live” [14, p. 415]. Socialisation occurs either through indirect processes, such as observing others, or direct ones, i.e. purposely being taught [15]. Direct socialisation methods include positive (e.g. praise) and negative (e.g. punishment) reinforcement, as well as other forms of explicit parental guidance, such as rules, reminders, instructions, and explanations. Such measures aim to control the child's external behaviour, and cause it to develop a self-directed, internal framework guiding its thoughts, feelings, and actions [15]. By contrast, indirect socialisation often takes the form of modelling (i.e. socially reinforced imitation), as well as conscious inference and subsequent application of the guiding rules of the observed behaviour. Both types of socialisation shape consumer practices, including

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energy use [16], but indirect processes generally prevail [9,17].

Articles on children's everyday energy consumption in the household are rare, and mostly based on teenagers [9,16,18]. Studies focusing on younger children have recently started to emerge [7,19], but so far are limited to Europe. Here, we explore how nine and ten-year-old children in Dunedin, New Zealand, use energy – specifically, electricity – in their homes, and investigate the processes and family dynamics involved in their socialisation into saving energy. Specifically, we will focus on the following questions:

- How do children use energy in their homes?
- To what extent do children engage in particular energy saving behaviours?
- What processes and family dynamics are involved in developing energy saving behaviours in children?

## 2. Methods

This study is based on individual semi-structured interviews with (i) 26 children attending Year 5 of primary school; and (ii) one of their respective parents. Complementary information was provided by three focus groups involving a further 14 children.

### 2.1. Field work

The children were recruited from five primary schools in Dunedin, New Zealand<sup>3</sup> (Supplementary Material, recruitment procedure) with different socioeconomic backgrounds (based on a decile system [20]), and varying levels of environmental teaching (Supplementary Tables 1 and 2). The participating families were diverse in terms of income level, parents' professions, family structure, ethnicity, and the characteristics of the dwelling.

Prior to the interviews and focus groups, all of the children were asked to take photographs on how they use electricity in their homes (Supplementary Material, recruitment procedure). These photos were then employed to guide the subsequent conversations, focusing on the ways electricity is being consumed, personal efforts and reasons to save it, learning about saving electricity, and relevant family conversations<sup>4</sup> (Supplementary Material, Guides 1–3). All the sessions were audio-recorded and transcribed. The focus groups were furthermore video-recorded to differentiate between the children's voices.

In addition to their interviews, the parents were asked to complete a survey (developed by the Energy Cultures Group [21,22]) rating, on a five-point scale, their own level of engagement with various energy saving behaviours, as well as their personal attitudes towards energy efficiency and environmental values. They also answered specific questions on family structure, characteristics of the dwelling, and the appliances that their children operate (Supplementary Material, Guide 4).

### 2.2. Analysis

All transcripts were subjected to systematic thematic analysis (using the software NVivo, ver. 9<sup>5</sup>), which involves the identification of main themes, followed by their transformation into codes and aggregation into categories [23]. Specifically, we inductively identified relevant segments as they emerged from the data, focusing on the overall meaning and topics covered by the participants, rather than on specific

<sup>3</sup> Following the guidelines, and with the approval, of the University of Otago Ethics Committee.

<sup>4</sup> The vast majority of stoves, water heating systems and heaters in NZ use electricity. When gas was used instead, it was included and discussed in the interviews in the same manner as electricity.

<sup>5</sup> NVivo was used only at its most basic level to save quotes and group them into nodes and themes. We did not employ any of the automatic coding and analysis features.

words. These segments were saved into nodes (e.g. setting heating temperature, no contact with appliance, talking about energy once a week), and then aggregated or subdivided into themes (e.g. using heaters, family communication, rules) in an iterative process. The results of this analysis constitute our primary findings, and were categorised in terms of the electricity saving behaviours performed by the children, the children's level of control as a prerequisite for engaging in such behaviours, and the various pathways used to socialise children into using electricity.

To explore the data further, we performed a content analysis of the key themes, and then used the latter to conduct a series of statistical analyses. Note, however, that the statistical analyses neither draw on a representative sample, nor aim to test particular hypotheses; they thus merely serve to complement the thematic analysis, and should not be considered on their own. For the statistical analyses, the codes from the interviews and the survey data were used to quantify (i) the energy saving behaviours performed by the parents and their children,<sup>6</sup> divided into low, medium, and high categories; (ii) the level of agreement between the children and their parents as to which behaviours the children actually performed; (iii) the children's level of control over appliances; (iv) the number of electricity behaviours performed by children voluntarily and/or habitually; (v) the parents' behaviours, attitudes and values; and (vi) the presence or absence, within a given family, of the main socialisation processes identified in the thematic analysis. These numbers were then compared and analysed via exact chi-square tests [24] (the significance threshold was set to  $p = 0.04$  to avoid unstable results), Kruskal-Wallis one-way analyses of variance, exact Mann-Whitney  $U$  tests [25], and correspondence analyses<sup>7</sup> [28]. Exact tests are designed to cope with small, unbalanced or poorly distributed data sets, and are thus suitable for this kind of study [24].

## 3. Results

### 3.1. Control over appliances

The children were highly involved in using electricity at home, and identified 45 different appliances which they used regularly. Television sets, lights, computers, electric heaters and heat pumps,<sup>8</sup> stereos, and microwaves were mentioned most often, whereas dryers, dehumidifiers and dishwashers tended to be operated primarily by the parents (Table 1). Interestingly, the majority of the children were operating electric heaters or heat pumps, contrasting with low levels of control over central household heating in France and the USA [17,29]. Many of the children were also involved in doing laundry and cooking.

In general, the children's perception of their own level of control over appliances was higher than that ascribed to them by their parents. For instance, in spite of Tim's<sup>9</sup> mother commenting that her children are "not supposed to touch it [the heater], but they have, so it gets turned off [...]. They know now", Tim reported that he and his sibling had "put a line where we should put it [the temperature] with a pen on our heaters, so we just know where to put it [...]. We just did it." The children's use of electricity in excess of their parents' expectations is a common "poaching" practice [17,29, p. 70].

According to the thematic analysis, the children's level of control on their energy use depended on several interrelated factors:

<sup>6</sup> This number primarily derives from the children's own answers (consistently performed behaviour = 1; occasionally performed = 0.5), but information provided by their parents was also taken into account to compensate for the fact that the children did not always realise the energy-saving effect of their own behaviour.

<sup>7</sup> To be considered, correspondence analyses had to be significantly different from 0 ( $p < 0.05$ ), and explain more than 20% of the total variance (total inertia values greater than 0.2) [26,27].

<sup>8</sup> Electrical heating, ventilating, and air conditioning devices used for space heating and cooling.

<sup>9</sup> All of the participants were given pseudonyms.

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