# Reception Children's Understanding of Fluid Intake

**by**

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## Abstract

### *Background*

It is important that children drink enough water throughout the day for the benefit of their wellbeing by being hydrated (World Health Organisation, 2004). However, it has been identified that children under 11 years do not understand the amount of fluid they need each day for good health (Coppinger and Howells', 2019). In 2019, they previously completed an international comparison between primary schools in Ireland and England focusing on children's understanding of fluid intake. Within their sample, only a small number of children were aged 4 – 5 years. This age category in England undertakes the Early Years' Foundation Stage Curriculum (DfE, 2014), within which they learn about the importance for: good health; of physical exercise; and a healthy diet. This thesis focuses on the gap in the age phase of the previous research and questions if young children understand and know about fluid intake.

### *Methods*

A questionnaire was adapted from Coppinger and Howells' (2019) to be age appropriate for young children, this included physical visual representations to aid question comprehension. From 4 different schools in the South East of England, 130 children were questioned between January and April 2019. To analyse the overall data, the Statistical Package for the Social Sciences 24.0 (SPSS) was used to analyse the data using MANOVAs ($p<0.05$) to consider statistical variance in age (by year and month), gender and school location, also Levene's (1961) test for quality variance was used.

***Results and Conclusion***

It was found that 46.9% of the children reported they consumed 500 ml or under a day. 38.8% highlighted that their teacher told them when to drink. Also, when the children were thirsty, if given the choice of stopping play to rehydrate or continuing to just play without drinking, 33.8% would continue to play ignoring their thirst response. It is concluded that this research provides an insight that has the potential to assist teachers in developing more effective resources and strategies to aid Reception children's current knowledge and understanding of the significance of drinking throughout the day. To provide a brief for further work, teachers need to encourage water consumption within lesson time by integrating a whole class drinks break, while also allowing children to carry water bottles into their child-initiated activities. Finally, the development of a community hydration pack needs further research.

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# ***Chapter 1 - Introduction***

## *1.1 The Purpose of the study*

This research study will investigate Reception children's knowledge and understanding of fluid intake; when they drink; how much they think they drink within a day, and who influences children to drink. According to Cloutier et al., (2018) possessing a basic knowledge of what encompasses a healthy lifestyle helps children practice and prepare for lifelong healthy behaviours. This includes maintaining an adequate hydration status to prevent dehydration, and the related physiological and cognitive impairments to children from not drinking their daily recommended fluid intake. Due to the scientific nature of this educational study, it will be necessary to explore some facets of biological science by-way of operational questions (O'Leary, 2004). Therefore, it is not the intention of this study to discuss all scientific issues relating to a Reception child's daily fluid consumption. As such, the focus of this study's aims is to ascertain the physiological necessities of fluid intake, to be able to gauge the depth of the Reception children's knowledge of the importance of fluid consumption, and how this understanding might have an impact on their cognitive functioning and educational attainment.

## *1.2 Physical Education and Physical Activity Rationale*

In England, Reception age children are between 4 and 5 years of age. It is stated by the British Association for Early Childhood Education, in the Development Matters Framework (p.27, 2012) that "children know the importance for good health of physical exercise, and a healthy diet, and talk about ways to keep healthy and safe". By applying this framework and the statutory requirement in the Early Years Foundation Stage (EYFS)

(DfE, 2014), as part of the early years' goal, it emphasises the importance of practitioners' teaching knowledge of a healthy diet and ways in which children may keep healthy. This involves developing both teachers and children's understanding of the importance of fluid intake, as such this research will investigate children's understanding of fluid intake and how teachers potentially influence their drinking habits.

In support of children acquiring the fundamental knowledge that water is an essential nutrient to sustain life, Jéquier and Constant (2010) denote that some of the signs of a deficit in this essential nutrient include headaches, fatigue and light headedness. These physiological impairments will be discussed in greater depth as part of the literature review section. Previously, Bar-David et al., (2005) suggested that children whom exhibit signs of water deficiency may lead to adverse effects on their cognitive function. Therefore, to assess Reception children's understanding and knowledge of the significance of fluid intake, this study will investigate 130 Reception age children in the South East of England. This will allow for the further development of existing research and new schools of thought to influence policy changes and pedagogical practice within educational institutions (Austin, 2016).

Within the research, there was a significant dearth of supporting literature that specifically refers to 4 and 5 year old children in relation to their fluid intake, as most previous literature focuses on children aged 8 and above. This identifies that there is a gap in academic knowledge relating to children's understanding of fluid intake amongst ages 4 and 5, which this thesis research will attempt to address. It will also consider what potential barriers there are to drinking from a child's viewpoint, which may help influence future educational policy and practice.

### *1.3 Positionality*

As a trained primary school teacher, who has worked with Reception age children for the last 6 years, I have developed the skills and knowledge to be able to talk with young children and to be able to elicit responses through using age appropriate language. I have also observed that the consumption of water by Reception age children within this time was extremely lacking. In addition to appendix 1, the personal rationale for embarking on this research, is to establish the level of understanding Reception age children possess in regard to their fluid intake, which could help enhance their knowledge and adults supporting them. It was also anecdotally observed that adequate uptake of fluids in the school day was not a main priority for the teaching professionals to instil in their daily rituals and pedagogical classroom practices. This therefore provides a rationale for comparing schools within the same geographical area of the anecdotal evidence, to establish whether similar issues are still exhibited by teachers. Additionally, due to the pedagogical practice of some teachers, it appeared that during the school day, the majority of children did not break regularly to consume fluids. Therefore, it is necessary to gain a quantifiable academic perspective relating to children's understanding of fluid consumption in the school day to enhance existing academic research. Hatch (2002) implies that teachers who are familiar and actively engaged in observing children in school settings, tend to encourage more accurate responses from the children, hence strengthening this researcher's contribution to a more enhanced understanding of fluid consumption amongst Reception aged children. Therefore, possessing this extensive knowledge of working with children of this age group for the last 6 years, and the experience of conducting a previous smaller scale study relating to fluid intake should enrich this investigation, as it will present the skills required to interact effectively with the Reception children to obtain quality data, but more importantly, enable

effective data analysis to syntheses new ideas, which may advise future policy, practice and future academic research.

### *1.4 Hypothesis*

Before the commencement of this study, due to the aforementioned involvement of working with children for an extended period of time and linking to Cohen, Manion and Morrison's (2018) work who suggest it is important to induce a selection of hypotheses to form the foundations of effective research. If children are following the Early Years Foundation Stage curriculum (DfE, 2014), they should be learning about the consumption of fluids within the school setting and should know and understand fluid intake. This additionally means there should be a consistent reply from the entire sample as to how much water the Reception children are and should be drinking daily, and thus this study needs to explore this. As they should be supported as to when to drink by their teaching practitioner through the curriculum, it is proposed that the teacher within the various settings should be the main influencer. Likewise, it is predicted that the young children should be expected to articulate their learning of this topic area with the researcher of this study due to the aforementioned reasons.

# ***Chapter 2 - Literature Review***

This chapter will explore the current research and literature by drawing from an array of sources to ascertain what is currently known on the topic of Reception children's understanding of fluid intake, to enable a well-informed and critical study to proceed.

Chapters for consideration are as follows:

- What do children drink?
- Why is it important to drink? A physiological perspective.
- Educational perspective of children's knowledge and understanding of fluid intake.
- How much fluid do children need to drink?
- The implications for children if they do not drink enough.
- What are the signs of dehydration?
- Do teachers and parents know and understand the signs of thirst and when to drink?
- Do children know and understand the signs of thirst and when to drink?
- Why might children not drink enough fluids?
- How to enable children to drink more water to meet EYFS diet and health goals?

## *2.1 What do children drink?*

Defining the concepts of fluid and water is important to differentiate to understand the difference. As recognised by Jéquier and Constant (2010) in their cross generational review of the effects of dehydration, they convey that water is a substance that alone can be used to help the body meet hydration demands but does not add to energy stores. They concede that fluid can be regarded as any form of liquid that assists children and adults to meet their hydration needs. However, they identified the caveat that unlike water, there are

other fluids that also add to energy intake, for example: fruit squashes or fizzy drinks. It is therefore essential to explore a subjectively simple retort to the research statement, to more effectively research Reception children's understanding of fluid intake.

As discussed by Patel and Hampton (2011), there is the theory that children when permitted, tend to opt for sugary drinks because they taste more appealing. This further adds to Petter, Hourihane and Rolles (1995) hypothesis of children being conditioned to consume sugary fluids or drinks containing a high sugar content. Over 50% of the 2 – 7 year old children in their sample size of 104, never wanted to drink water and instead were encouraged by adult care givers and teachers to drink fluids that included sugary drinks. Patel and Hampton (2011) continue to posit the view that one way to combat this discourse is to encourage children to consume fresh drinking water, and subsequently educate them into understanding the benefits of adequate consumption. However, as found in their study in the United States, children did not like the taste of ordinary water because it is often not of the correct temperature people enjoy, and thus too warm and not refreshing. Moreover, from this researcher's teaching experience, it is often the case that water bottles within school settings are stored in the corner of a classroom rather than stored in cooler conditions. This, in turn, would mean water would get warmer throughout the school day becoming less refreshing and appealing to consume. Moreover, this issue matched with the recent findings of Van Belzen, Postma and Boesveldt (2017) that cold products were far more thirst-quenching for a whole sample of 45 adults than warm beverages. It must be recognised that although based on adults, it shows similar preferences to the work of Patel and Hampton (2011), and suggests that all ages prefer beverages of enhanced taste and cooler temperature. It can be established that to provide cold water for children, this may

improve the possibility of a child selecting the healthier option of water, rather than a sugary alternative. However, practically this would mean that schools would require a separate electrical circuit for an additional fridge to store water, therefore pragmatically perhaps, storage space may be an issue for schools.

With a focus on providing alternative fluid products, Stooky et al., (2007) provide the insight in their study which concerned 25 overweight women. Although water is the ideal beverage from a health point of view, low and zero calorie tasty alternatives could be offered to encourage children to drink more, to meet their hydration needs due to the enhanced taste. It was theorised by Benelam and Wyness (2010), whom examined literature pertaining to a broad age range of children and adults, in regard to effective hydration, that although water is the ideal choice of beverage to rehydrate, because of the 100% water content, there are a range of beneficial alternatives that can be utilised to help meet hydration needs. As previously mentioned, fluids such as fruit juices or ordinary fizzy drinks contain between 85-99% water, could in theory be used to help hydration needs. However, the high quantities of sugar added to provide an enhanced taste would be one important drawback to consistently providing these drinks to people, including children. Most notably, because children and adults can only store a finite amount of sugar for energy expenditure, whereby, assuming children have a surplus of overall daily calorific input when compared to output, any excess sugar can be easily stored as fat for later use, thus causing excess weight gain (Glimcher and Lee, 2009). In Stookey et al's., (2007) opinion, teachers and care givers could possibly offer 'no added sugar drinks' to our children, in an attempt to encourage young children to drink more water-based drinks. Benelam and Wyness (2010) continue by suggesting these options provide very little additional energy

for the body to utilise, and thus could be used as a substitute to water. However, there is one fundamental issue with this, although these drinks such as no added sugar flavoured squashes contain between 90-99% water (Benelam and Wyness, 2010). Drinks such as these usually can contain artificial sweeteners, such as aspartame, to replace sugar to provide the added taste to water. Mercola (2014) states in his North American positioned research, aspartame confuses the body into thinking it has already had enough sugar, and in turn is more likely to store any additional sugars as fat, assuming there is also a calorific surplus. While previously Lean and Hackney (2004) suggest in their Scottish review on the topic, that a high level of consumption of these beverages can also help children to develop a "sweet palate". This in turn can encourage children to crave other sweet products, ultimately adding to their energy input, which if not utilised, would be stored as fat. This ultimately is supported by Edmunds et al., (2009) in their work concerning weight gain of adults and children aged 5 years and older. They discuss the well-known association of the consumption of artificially sweetened drinks and weight gain, but each of the associated claims need context of the evidence acknowledged if we are to provide useful policy for children. However, it must be noted that these arguments could lead to the reasonable suggestion that to avoid any risk of childhood weight gain, while also meeting children's hydration requirements, the most appropriate fluid choice for children is water. This statement of exclusively providing water to children in school would be supported by Coppinger and Howells (2019) who established an international perspective of the knowledge of water intake from Irish and English primary school children. They found that 41% of all 322 respondents named water as their preferred beverage of choice, with an additional 23% identifying a cordial or water-based squash as their favourite. This therefore would update the older work by Petter, Hourihane and Rolles (1995), that over 50% of 2-7

year olds are being conditioned to drink sugar based drinks rather than water as an alternative.

### *2.2 Why is it important to drink? A physiological perspective*

Before exploring the educational rationale for consuming adequate fluid, it is significant to critique why it is important, this will be considered through a physiological perspective. Although it is important to note the researcher's background is predominantly within education, not in sports science, nor nutrition sciences or public health. The core rationale for why both children and adults need to consume fluids on a regular basis, is to preserve life and to stay alive. This concurs with Jéquier and Constant (2010) whom explain that life is preserved by the fluids acting as carriers for all essential nutrients and waste products that are transported around the body. Wells et al., (2005) highlighted that Reception age children have on average 65% water content attributable to their total body weight; therefore, physiologically and educationally it is important for young children to learn how much they should drink and understand why it is important. This may encourage them to replace their water levels to ensure they keep a consistent internal temperature and can transport the essential nutrients round their bodies.

Essentially, children should drink when they feel that their biological state of homeostasis has changed (Jéquier and Constant, 2010). However, Shaw (2010) claims there is a fundamental issue with this; children inherently find this process very hard to do, due to not having developed an effective thirst response to tell them when to drink. Therefore, this emphasises the importance of adults, such as parents and teachers, in educating children when to drink, which is why this thesis will examine who helps supports and influences children to drink. This facet of thirst response will be discussed in greater depth

in a later section (2.6.1), as it is significant to firstly discuss the importance of homeostasis. Ballauff, Kersting and Manz (1988) suggest one aspect of homeostasis is the ability for one to be able to self-regulate temperature. For example, this feature of the biological process keeps the body temperature stable, even though external factors' such as physical exercise and exterior temperatures hinder the stability of ones body temperature. Moreover, Ballauff, Kersting and Manz (1988) also believed in their study concerning 21 healthy children aged 6-11, in Switzerland, that water is crucial for the self-regulation of body temperature to occur due to the cooling agent of fluid. It is widely believed by the World Health Organisation (2004) to name one governing body, that not consuming enough fluids will cause dehydration and hence hinder the aforementioned aspect of homeostasis. Jéquier and Constant (2010) emphasise that there are 3 types of dehydration: *isotonic dehydration*, where excessive water is lost via the gastrointestinal tract, for example diarrhoea; *hypotonic dehydration* where again fluid is lost on a large scale via sweating and urination but replaced with too much water. Consequently, this causes the cells to swell within the body and creates a feeling of bloating. Finally, there is *hypertonic dehydration* which is caused by insufficient water input when compared to output, caused by normal bodily functions and sweating. For the purpose of this study, *hypertonic dehydration* will be the primary focus to support the research because this is what the majority of people feel when they state they are "dehydrated" (Jéquier and Constant, 2010), and in turn for the remainder of this thesis, the phrase 'dehydrated' will be used.

In their North American study, Grandjean and Grandjean (2007) suggest that the negative physiological and cognitive effects of dehydration materialise after a reduction of 1-2% of total body weight. This figure corresponds with Benelam and Wyness (2010)

within their review published by the Nutrition Bulletin, that again the early signs for hypertonic dehydration unveil themselves at around 1-2% of total body weight lost. Kleiner (1999) briefly outlines these early signs in her short review, are when an individual complains of, in a descending order: flushed skin, headache, dry mouth, dark urine with a strong smell, and finally together culminating as one: sunken eyes, a feeling of fatigue, loss of appetite and light headiness. As such, exhibiting these signs could have an impact on the wellbeing of children.

Understanding the benefits and limitations of adequate hydration could help allow children to more effectively meet their physiological and educational needs. Bonnet et al., (2012) found that almost two thirds of French children within a large sample of 529 primary school children aged 9-11, showed early signs of dehydration when they went to school in the morning, despite having breakfast. This statistic is clearly not ideal due to the aforementioned negative cognitive effects in the previous section, and physiological impairments outlined by Kleiner (1999). In Bar-David et al's., (2005) work where the primary reason for their research was to gain an understanding of a correspondence between dehydration and cognitive performance, in the process of researching this area, they found that 32 out of the 51 child participants (62.7%) were dehydrated in the morning, and 81% of that 62.7% were still dehydrated in the afternoon. Therefore, owing to these findings, Grandjean and Grandjean (2007) continue to denote that the clinical signs of dehydration demonstrates a 1-2% reduction of total bodyweight.

Due to these prior declarations, part of Benelam and Wyness' (2010) study was conducted to establish how rapidly fluid restriction would cause total body weight loss, and

in turn the early signs of dehydration set out by Kleiner (1999). It was found that after 13 hours of no water uptake, 1% of body weight was lost. After 24 hours of minimal water intake, 2% reduction of total body weight loss occurs. Upon acknowledgement of this source and in collaboration with claims by Bonnet et al., (2012) that over 60% of children arrive at school thirsty. It can be deduced that some children are arriving at school already not having a drink due to the hours of bedtime and the start of school (e.g. 8pm - 9am). This would be a sufficient time-lapse to enable the 1% reduction to occur, because it can be assumed that a child's last beverage could have been at dinner or just before bedtime the night prior. This assertion of a lack of breakfast and the subsequent dehydration is rather plausible, if this review were to additionally match together Box's and Landman's (1994) older research, that only 20% of London children aged 5-8 had an adequate breakfast. It must be recognised that a large proportion of London tends to be socioeconomically disadvantaged (Cox et al., 2006), and thus could play a part in this statistic, due to the financial constraint on many families to purchase essential breakfast items. Considering this position of children having an inadequate breakfast, a child would lose between 1-2% of their total body weight in fluids. Therefore, this evidence gives an even more important rationale to conduct the study in a similarly deprived geographic area, such as Margate in Kent, as this has one of the most socioeconomically deprived populous' in the country (Kent Public Health Observatory, 2016). If children are regularly not having breakfast before school they would not have been told to have a drink, and therefore it is vital for teachers to find space first thing in the morning when children arrive to educate them to have a drink.

Humans should consume fluids so they are 'euhydrated' (the natural status of hydration, neither overhydrated or dehydrated) before the start of physical exercise as suggested by Stand (2009). This is to ensure that any loss of fluid due to physical exercise can be easily restored after finishing activities. Benelam and Wyness (2010) would agree by suggesting that children in particular are regularly most physically active at lunchtime, which tends to be the hottest part of the day. Thus, the likelihood for the increased fluid demand would also rise because of the increased sweat production caused by physical activity. They continue to suggest that after exercise where a much higher output of water has occurred, due to sweating to keep the body cool, the body struggles to meet the demands to return to homeostasis and euhydrated status. The implications to educational practice is that there is a need for teachers to ensure that within the school setting that children have drinks, before, during and after PE lessons as well as break-times.

Rehydration must come from fluids which have a high concentration of water and not food sources (Benelam and Wyness, 2010). However, it would appear that children in England and Ireland are perceiving themselves to not be drinking enough to meet the daily required hydration status. Coppinger and Howells (2019) found that out of 322 children, aged 4-13, that 41% of children under 9 years old felt they only consumed 500 ml in a day when they took part in physical activity lessons, therefore perceiving they drank much lower than the 1.1-1.3L a day recommended by WHO (2004). Coppinger and Howells' (2019) work also supports the much older research of Bar-Or et al., (1980), where they also found that children often do not drink fluids after exercise. It must be acknowledged that Bar-Or et al's., (1980) work is 40 years old and possibly is out of date, however due to the fact it is still being cited in recent and up to date work in 2019, it justifies that with the

aforementioned notion of ‘increased physical activity at lunchtime’, it only heightens the risk of dehydration to children, and thus a whole class collective drinks break could prove beneficial. As a result, this thesis needs to examine when in the day children think they are most thirsty, and whether they recognise thirst after exercise if they know and understand that they then need to drink and rehydrate. Bar-Or et al., (1980) suggests because children have a habit of not taking hydration before and after exercise, it could be considered appropriate for a teaching practitioner, after a break in learning to contemplate a dedicated time slot for all children to rehydrate from their physical activity, to negate any chance of a child becoming more dehydrated as the day goes on.

### *2.2.1 Educational perspective of children’s knowledge and understanding of fluid intake.*

As found out by Christiansen et al., (1994), between the ages of 0 - 74, 73% of the human brain is water with little variation due to age. This in turn could mean if children do not drink enough, having poor hydration could hinder cognitive function, as the brain does not have enough fluid, and thus may not work as efficiently. Bar-David, Urkin and Kozminsky (2005) focused on the correlation between decreasing levels of fluid intake and cognitive function, with fifty-one 10-12 year old children in Israel. It must be noted that this research was conducted in Israel, and thus is hotter in climate temperature to England, however this substantiates the point that the body needs to absorb fluids to assist cognitive function. In their research, numerous cognitive tests were conducted that required different levels of cognitive ability: identifying a number in a pattern; auditory number span memorisation; constructing conceptual categories between 2 lists; a verbal analogies test to assess matching of a word to a different word in a list, and number addition of 1 or 2-digit numerals. They also conducted urine test samples to measure dehydration levels

before the commencement of the cognitive tests to measure the amount of fluid present in the body. They found that 62.7% of the pupils were already dehydrated in the morning of the research, where when simply comparing hydrated and dehydrated children, the tests in general produced results that correlated with scores being superior hydrated. Short-term memory tasks were specifically highlighted as worst effected, whereby hydrated students preformed significantly better than their dehydrated peers. Melton (1963) in Michigan, highlighted the importance of short-term memory in learning and suggested that any new information that is important must pass through the short-term memory to be embedded into the long-term memory.

In response to the extensive research by Bar-David et al., (2005), Edmonds and Burford (2009) continued in a study in East London, comprising of 58 children, aged 7-9, whereby they conducted cognitive assessment tests on two groups of primary age children, one group had an additional 250 millilitres (ml) of water and a group that did not. It was found that the children whom had drank an additional 250 ml of water, prior to the commencement of the tests, scored higher in short-term memory-based tasks. Whereby, when calculating the mean results as a percentage, the group who consumed 250 ml of additional water, demonstrated a 10% increase in performance over their dehydrated peers. This result is further concurred by Gibson-Moore (2013), who completed a comprehensive guide to improve the hydration of children, and found that even a 200 ml dose of water before the commencement of an activity improved results ‘significantly’. Therefore, from an educational perspective, it is important to ensure children are sufficiently hydrated to not impair their learning.

However, at this point it is relevant to consider, how long it takes before the renewed hydration status has an impact on the ability to help children learn more effectively. Adan (2012) suggests in her review on the topic in Barcelona, that the effects of additional fluids in response to a child's improved cognitive ability only takes two minutes from consumption to have a cognitive effect. For example, this may suggest that if children were to drink additional water as they return to the classroom from morning break, the period of time from consumption to sitting down in the class ready for teacher input, could reasonably be as little as 120 seconds. Consequently, this is likely to assist in minimising disruption to learning that may be caused by the children not being able to concentrate due to being dehydrated.

One facet in the Development Matters framework (BAECE, 2012) and EYFS framework (DfE, 2014) is that children follow directions involving multiple ideas or actions. For a child to remember several ideas or actions, it must therefore be processed through the short-term memory (Gathercole and Alloway, 2006). Thus, Gibson-Moore's (2013) is suggesting that children would be able to more effectively meet this statutory requirement if they were to regularly keep up with their hydration needs. In addition to this, children are required to use phonic knowledge to decode regular words (DfE, 2014). To enable children to know this phonetic knowledge, they must then in turn initially learn the various phonemes and graphemes to decode the regular words. Thus, as previously mentioned, this new knowledge must initially pass through the short-term memory to then embed into the long-term memory for successful recall. Consequently, in the viewpoint of Edmonds and Burford (2009) this can occur 10% more efficiently if the children have a consistent uptake of fluids. As a result, as previously mentioned this thesis research will

examine and pay attention to whether children have access to water and understand when to drink.

After leading research surrounding an enquiry into why people drink, Saltmarsh (2001) believed that drinking behaviour is formed from early childhood, and therefore good habits towards drinking water should be encouraged from the earliest point in a child's education. As gifting children good habits surrounding fluids from this early age of Reception could only be of benefit, where additionally in Howells' (2012) opinion that primary age children "are forming their likes and dislikes" (p. 209) in the primary setting, and in turn further supports the discourse of researching the current knowledge and understanding of fluid intake from this young cohort is a necessity.

### *2.3 How much fluid do children need to drink?*

In his criticism that people do not really require 6-8 glasses of fluid daily (World Health Organisation, 2004), Valtin (2002) insinuated that there is no evidence to support various declarations made by leading health officials. Since 2002, there has been a large degree of evidence to counter his claim. Shaw (2010) stated in her keynote at Great Ormond Street Hospital in London for Institute for Health, that adults over the age of 18 and children 4-8 years of age require different amounts of fluid in order to remain hydrated. Therefore, it is important to educate young children about the appropriate fluid intake specifically for their age range. Swaka, Cheuvront and Carter (2005) draw attention in their general review that 4 - 8 year olds need 1.6-1.7 litres (L) a day of fluids for effective hydration. This is a widely accepted figure, and most likely draws upon the World Health Organisation's

(2004) previous conclusions. This required quantity has been further supported from a variety of other sources, including the European Food Safety Authority (EFSA, 2010) and the National Health Service (NHS, 2011); however, this amount includes all sources of fluid uptake, including the fluids children absorb through food. This absorption of fluid from food could be one of the reasons why children find it difficult to fully understand and know how much fluid they are consuming, as they need to be educated about not only fluids but also the complexity of fluids from food (which for 4 – 5 year olds, this could be beyond their comprehension levels). This is why this thesis will focus only on fluid intake, not fluids in food. Benelam and Wyness (2010) conducted a large-scale review, whereby they concluded that children and adults acquire 20% of their daily hydration needs from food. Meanwhile, the EFSA (2010) also issued a report that same year indicating that children and adults receive an even larger proportion of their daily fluid requirements of between 20-30% from food. Therefore, with children obtaining between 20-30% of their daily fluid from food, it can be induced that 70-80% of actual fluid required for children of Reception age would be a figure of between 1.1-1.3 Litres (L) of fluid that is directly attributable to drinks. This notion would agree with the EFSA (2010) and Gibson-Moore's (2013) claim that to improve 4-8 year old children's hydration, they require that same figure of 1.1 - 1.3L of pure fluids. Moreover, the British Nutrition Foundation (BNF, 2016) would also entirely disagree with Valtin (2002) in their guidelines for hydration for children, and even go as far to suggest various methods in which to assist children to meet this requirement, this will be discussed later. This claim by Valtin (2002) that there is little evidence to support children should drink 6-8 glasses of fluid a day, is potentially even more dubious when the statistics by Jéquier and Constant (2010) are applied for fluid output vs fluid input. It is recognised that their findings are based on a French educational system, but they state that human beings have, on average, a fluid output of 60% from the urine they expel on a daily

basis. Jéquier and Constant (2010) continue to suggest that in order to replenish this 60% of fluid loss, it must be replaced with tangible liquids. Thus, coming very close to the aforementioned guidelines of 70-80% of physical fluids, and in turn also disproving Valtin's 2002 claim. Following this review of the literature, children's understanding and knowledge of fluid intake, as well as their drinking habits, is a relatively new topic area and potentially further guidance is still needed for practitioners and teachers to aid and support young children's learning of this area.

### *2.4 The implications for children if they do not drink enough*

One implication for children if they do not drink enough is linked to their sweating rates and loss of water through sweating. Reception aged children sweat when they are most physically active, which during school time is most likely to occur in their lunchtimes or break-times. Stand (2009) reviewed in North America, how much fluid is lost through sweating and found that a 50 Kilogram (Kg) individual running at a slow speed of 5.3 miles per hour (mph) would sweat on average 430 ml an hour in a cool climate of 18 Celsius (°C) and 520 ml an hour in a warmer climate of 28°C. From this calculation, it is possible to calculate the potential average water loss of a 20 Kg individual following exercise (average 5 year old weight) (WHO, 2007). In a 5 year old child, weighing 20 Kg, they would sweat 175 ml an hour if they were running at an average pace of 5.3mph at break-time. 175 ml is approximately 1% of the weight of a 5 year old child. This loss would need to be replaced as possible after exercise, to ensure euhydration returns and normal cognitive functions proceed. However, Grandjean and Campbell (2004) would contest this finding behind childhood sweating rates in their American positioned research, as they found that children have lower sweating rates to that of adults, as children have different body temperature

regulators. Nevertheless, sweating occurs in all human beings during periods of physical exercise.

Sweating rates aside, this thesis will ask the children about their current drinking habits on 'outside' and 'inside' lunch days because of the impact of midday sweating. This could gain a greater understanding in to whether these 4 and 5 year old children have the knowledge that exercise will mean they sweat more, and thus need to drink more. Stand (2009) suggests that it is generally accepted good practice for all human beings to rehydrate after physical exercise.

### *2.5 What are the signs of dehydration?*

To first assess whether children and teachers recognise the signs of thirst it is important to reiterate the signs of dehydration outlined by Kleiner (1999). These are exhibited in the following order: flushed skin; headache; dry mouth; dark urine with a strong smell. Jéquier and Constant (2010) continue this brief analysis of the acute signs by adding that someone whom is dehydrated would feel lethargic, have a decreased urine output and also shed few to no tears if they were to cry. Therefore, these physiological factors all have ramifications to a Reception child's learning and greater wellbeing to access learning because their concentration may dwindle owing to a lack of fluids. Maslow (1958) outlined in his seminal work of the hierarchy of needs, that in order for a child to learn effectively, they must first have a number of basic 'needs' met, including the physiological requirement of consuming water. Most importantly, it was reinforced by Maslow (1958) that the basic human physiological necessities are cared for, and thus it could certainly be argued that if a child were to exhibit these signs, such as headaches and

lethargy, then attempting to teach children new skills and knowledge might be adding more challenge to what is already a subjectively difficult task for practitioners. As aforementioned, these physical signs of dehydration normally materialise when someone has lost between 1-2% (Bar-David et al., 2005) of their total body weight in fluids. Although Mackenzie, Barnes and Shann (1989) would agree with these dehydration signs, they would however dispute the timeline of the acute signs of dehydration. In their research of 102 child patients admitted to hospital in the year of their research for dehydration educed illnesses, 5% were dehydrated in terms of percentage weight lost, as opposed to the later reported 1-2%. Lieberman (2007) continues to elaborate on this topic in his North American review, and suggests another measurement by proposing that the physical issues of dehydration become apparent at 3-4% of body weight lost. As it can be seen from the literature, there is great variance in when the signs of dehydration could occur, this may explain why teachers and practitioners, as well as children, find it difficult to identify signs of dehydration, thus providing a stronger robust justification for why a more enhanced understanding of fluid intake is needed for all.

### *2.6 Do teachers and parents know and understand the signs of thirst and when to drink?*

As suggested in their North American research that from a sample size of 122 parent participants, Gittelman, Mahabee-Gittens and Gonzalez-del-Rey (2004) found that two thirds could only identify one out of the many aforementioned signs of dehydration. This could explain why children therefore do not know and understand when to drink. Johnston-Malloy et al., (2008) researched that out of 12 teachers from primary schools in Ireland, that the participants possessed a poor knowledge on the hydration requirements of children

and themselves, while also actively discouraging the consumption of drinking in lesson time due to children: physically drinking fluids; filling up their water bottles and leaving the classroom to go to the toilet. It can therefore be assumed that because these teachers have a poor knowledge surrounding water intake requirements, that they may also have an equally poor knowledge of the signs of dehydration. Therefore, this leaves the deduction that some practitioners would be unable to suggest to their pupils to have a drink of water because they do not know the signs themselves. Consequently, it could be suggested that a course of action should be taken in regard to teachers' professional development. This would require training education professionals into the cognitive and physiological signs of dehydration, and the impact of effective hydration. In turn, enabling children to learn from the enhanced practitioners knowledge, life experiences and personal habits. As a result, this thesis will further explore this facet as to whether there is an influence of school staff encouraging the Reception children's regular consumption of fluids.

### *2.6.1 Do children know and understand the signs of thirst and when to drink?*

Investigating the theme of drinking fluids, Severs (1979) discusses the idea of homeostatic and non-homeostatic consumption of fluids to obtain homeostasis (the neutral state of biological equilibrium). Whereby, the idea of homeostatic drinking would refer to the unambiguous physiological changes that occur in the body to encourage different bodily functions or behavioural reactions. This would manifest itself as the compelling urge to have a drink of water. Non-homeostatic intake would therefore be the opposite of this, whereby a person, such as a teacher, parent or friend, would remind a child to consume fluids to achieve homeostasis. Therefore, it could be suggested, that teaching practitioners should further educate themselves and young people about the signs of dehydration and

wanting to have a drink. This could encourage more consistent uptake of liquids by children, to enable more coherent and consistent states of homeostasis. In addition to this claim, D'Anci, Constant and Rosenberg (2006) state that when researching both children and adults, due to the differences in agency within these two demographics, children are much more likely to become dehydrated because they are dependent on adults providing fluid updates, and hence are dictated as to when hydration occurs. For example, if a teaching practitioner did not understand the full limitations of the effects of dehydration, they may also not understand the importance of regular consumption for their children. Therefore, this area of agency within children's drinking will be further examined in this study.

Fundamentally, in Benelam and Wyness' (2010) informed opinion, children should drink when they are thirsty, which is when the body detects that additional water is required, resulting in a dry mouth and throat. Yet, it could be proposed that young children need to be taught these initial signs of thirst, and to drink to avoid these indicators. According to Kleiner (1999) a dry mouth and throat is the third stage in the physiological signs of dehydration. Therefore, this thesis will explore as to whether children recognise the earlier symptom of thirst, such as flushed skin after exercise. According to Pyszczynski, Greenberg and Solomon (1997, p.1) adults tend to know when they need to drink to ensure their continued survival, otherwise known as the "terror management response". Moreover, they can sense when they are dehydrated and need to consume fluids to enable optimum cognitive function, such as the ability to maintain homeostasis and obtain the 10% improved cognitive function (Edmonds and Burford, 2009). Shaw (2010) supports this premise by suggesting that children's thirst sensitivity is not as well developed as that of

an adult, and thus it is thought that drinking fluids, to stay hydrated, which is a learned behaviour when this thirst sensitivity has developed effectively. Benelam (2010) also continues Shaw's (2010) notion, by stating that young children do not have suitably developed brains to recognise when to drink, as this response is not developed until later in life, again indicating the potential vital position of the teacher to help aid this. However, Shaw (2010) reinforces that strategies learnt from earlier in childhood can be utilised in order to help them to remember to drink regularly throughout their lifespan. Additionally, it was found by Coppinger and Howells (2019) that only 24% of 4 and 5 year old children could name themselves as someone whom could instigate their own uptake of fluid, therefore indicating that this age range needs additional support. Children need consistent reminders to drink fluids, because as the BNF (2016) state by continuing Shaw's (2010) notion, that even though the thirst response is not fully developed in children as young as 5 years of age, the continual reminding of the uptake of fluids will place good habits for later in life. Essentially, where drinking to stay alive is a primal instinct, (Pyszczynski, Greenberg & Solomon, 1997) knowledge of drinking for optimal human function is accrued through life (Shaw, 2010).

It was also theorised that once fluid has been consumed, its impact has a considerable delay for physiological effectiveness, as it takes 45 minutes to become hydrated from moderate dehydration, but only 2 minutes to benefit cognitively (Adan, 2012). When Kenney and Chiu (2001) researched for the United States Government, they concurred that in a physical activity lesson lasting less than 45 minutes, when compared to young adolescents and adults, children infrequently show the signs of craving hydration via homeostatic avenues, thus increasing the chance for dehydration to occur if not

prompted by another person. This, in addition to the fact that in general within England, PE lessons and time on the playground at lunchtime typically lasts around this time of 45 minutes, this observation is rather pertinent and possibly the reason why children don't elicit the thirst response. Using Johnston-Malloy et al., (2008) as a basis whereby they also found that teachers are not keen on children having access to water due to the disruptions of: physically drinking, filling up the water bottle, and leaving the class to go to the toilet. It can then be assumed that children do not take their bottles into their PE lessons or onto the playground due to these perceived disruptions. Therefore, children could accrue an additional water deficit in the school day, not only because the children are physically active in the PE sessions, but also due to their negligible access to fluids. One of the most effective ways of teaching children when to drink could be to have set times for drinking such as after break-times, lunchtimes and PE lessons, to meet the children's hydration needs whilst minimising disruption.

### *2.7 Why might children not drink enough fluids?*

It is important to discuss the potential issues as to why children may not drink enough water. In addition to a dislike of lesson time consumption and disruption, Johnston-Molloy (2008) also discuss the practical issue that some children simply do not think that it is 'stylish' or 'popular' to drink ordinary water. This subjective view of the unpopularity of water could date back as far as 1995, where Petter, Hourihane and Rolles discusses the discourse of children in South London were being conditioned to drink water that has had its flavour enhanced by a fruit squash, and as such complain that conventional water does not taste as appealing. When embracing Burnett and Burnett's (2012) work, it is acknowledged that a seismic shift occurs from drinking as a functional activity in the

1950's. This was mainly due to traditional dietary options and drink product marketing practices in the 50s, that drinking fluids is an activity to be enjoyed now. Consequently, drink manufacturers universally began to introduce additional flavours to beverages by a way of flavoured squashes and fizzy drinks; hence assisting with this facet of drinking for enjoyment. As a way to combat this, Kaushik et al., (2007) introduced a nationwide (in England) initiative called "Water is Cool in School". This campaign attempted to change attitudes towards water within Primary and Secondary educational establishments. Unfortunately, this researcher who has worked within a wide array of primary schools for the last 6 years, has noticed that this campaign has not been sustained, because it is not currently practiced in the schools within the geographical location of the intended research. It can be proposed, that this campaign was conducted 12 years ago, amidst the turn of a new governmental ideology from the then Education Secretary, Michael Gove (2010), and the new Early Years Foundation Stage Framework in 2014 (DfE). It could then be considered that the significance of adequate water uptake was disregarded by the parliamentarian legislators as not particularly high on the agenda for schools to promote, despite the alarming and compelling evidence to support the benefits of it. Moreover, the 'Water is Cool in School' campaign (Kaushik et al., 2007) most likely did not stand the test of time because in the words of Ofsted (2015), that in judgement of schools "progress of pupils will be given the most weighting". Therefore, with this ideology in mind, it could be deduced that schools may have limited access to water without realising the aforementioned potential cognitive benefits. This however could be counter intuitive, because as previously mentioned, adequate water uptake assists with children having unimpaired and improved cognitive function, where additionally because it assists with their physiological needs being met, children are one more step to attaining self-actualisation to access learning effectively (Maslow, 1958).

Children's potential dislike for conventional water is one facet to the many reasons why children may not drink enough fluids and the possibility set out by Van Belzen, Postma and Boesveldt (2017), that water may be too warm to be enjoyed. Colonnesi et al. (2017) suggest that from a sample of 110 children in France, there is an anxiety issue among children as young as 4 and 5 years old, whereby they suggest that children of this age have a reluctant nature to independently stop play to meet their wellbeing needs. Subsequently, for the benefit of this literature review, this posit could also infer that children would rather continue their play than break from the crowd and have a drink of water to meet hydration needs. This aspect supplemented a specific interest for this study as to why Reception children in particular may not drink enough fluids throughout the school day. This is because the Early Years Foundation Stage (DfE, 2014) has a strong emphasis on learning through play, thus if children are having issues of breaking from their play to have a drink of water, then clearly this supports Colonnesi et al.'s, (2017) intervention that this is an issue for children and practitioners to address in the future. As such, this supports the rationale for this thesis to examine whether children are encouraged to consume fluids by their teachers or whether they are left to their own devices to meet hydration needs in the classroom. Furthermore, as also suggested by the BNF (2016), if teaching professionals were to teach our young children good habits towards water, such as allowing access to fluids during break and lesson times, it can be the case that attitudes could be changed to reflect the essential perception of water consumption in the 1950's. This would not only create an ethos of a like for water, but encourage children to drink at every opportunity during the foundation stages of their learning. Ephgrave and Bilton (2012) suggest in their practical documentation of a Reception year in action, that providing opportunities of life experiences for children in their play not only enriches their learning, but also their holistic development. Perhaps water bottles could be taken by the children into their child initiated

play learning areas, or for teachers to plan their environments to include water experiences that encourage children to drink more water. This would not only elicit further development of a different relationship with water in the form of playing with the substance but form a partnership; whereby, water consumption is engrained within their play and learning.

### *2.8 How to enable children to drink more water to meet the diet and health goals of the Framework*

As previously mentioned within the Development Matters Framework (BAECE, 2012, p.27) Reception children must know "the importance for good health of physical exercise, and a healthy diet, and talk about ways to keep healthy and safe". This statement in which children must be taught ways in which to keep healthy should, in this researcher's opinion, include the implementation of discussing some of the aforementioned factors in regard to drinking fluids, as currently the significance of drinking water is not statutory or collectively practiced in schools. Therefore, to help schools meet this aim within the Development Matters Framework (BAECE, 2012), teaching children to understand about their fluid intake and recognising when to drink should form a statutory requirement, and thus a policy review could be justified. This notion would be supported by the BNF (2016) when they released a set of voluntary guidelines of how children can remain hydrated. These include: ensuring children have a drink during break-times, be regularly offered drinks by parents and teachers, and ensuring that a water bottle is packed within the school bag. As a result, it is therefore essential that not only education into good drinking habits will assist children to drink more (Cloutier et al., 2018); however, as Bar-David et al., (2005) suggests that by providing children with more opportunities to drink, such as

allowing access to water on the playground and in lesson times, will yield more beneficial results.

Although, these recommendations are for effective fluid consumption during school times, ensuring children are offered drinks and have access to water at home is also a significant factor that this literature review needs to consider. Due to the previously cited literature involving parents and teachers, it leaves it to this literature reviews reiteration that both parents and teachers need to be taught these signs of dehydration. This will enable both parties to intervene when they notice a child whom is dehydrated, and thus in turn can stop this facet of preventable physiological affliction. In addition to the teaching of dehydration to more knowledgeable others, such as parents (Vygotsky, 1978), as previously suggested, Bar-Or et al., (1980) suggested that there should be an "on mass" drinking pit stop after breaks in learning time. This idea could also be applied to home and having mass drinking times as a family at home. This would enable the children to meet their hydration demands after physical exercise and because they are being told to consume fluids, the fact that children of primary age have an ineffective thirst response (Shaw, 2010), with a 45 minute delay, this will negate this issue. Moreover, children will also develop behaviours and likes towards the benefits of adequate fluid intake because they would be encouraged to drink more frequently. These likes would be developed in a primary school setting, which consequently, Howells (2012) confirms will form the basis of habits into adulthood.

This literature review has considered a magnitude of questions and issues surrounding a formal basis in which to allow the researcher to ascertain what knowledge and understanding Reception children have in regard to their own consumption of fluids.

Cloutier et al., (2018) researched children's knowledge of healthy behaviours and that if teachers were to gift children an understanding of their own habits, it was theorised that this could cause a sociological change in culture, to not only enable children whom can learn more effectively but also gift children a better quality of life as they proceed into adulthood.

# ***Chapter 3 - Methodology***

## *3.1 Methodological Considerations – A View on Realist Ontology*

To allow this study to interpret particular underpinning methodologies, it is firstly important to consider the wider implications of research paradigms. Cohen, Manion and Morrison (2018) suggest that for a researcher to comprehend the core facets of research methodologies, there must be an understanding of why these approaches exist. They continue to state there are two key underlying paradigms within research, ontology and epistemology. Crotty (1998) supports this by previously suggesting that ontology is a practice that attempts to gain a greater understanding of what exists in the World and the wider Universe. Whereby, he concludes that to be an ontological researcher, one would position their research to make deductions to extend the field of current knowledge in the broad physical realities within our plain of existence.

Consequently, there are multiple variants within the wider scope of ontology, in which a realist ontological approach appears to fundamentally bind itself with this study. Guba and Lincoln (1994) implies that this approach recognises that the World in which we live is shaped by social constructs, cultural customs and economic issues. As such, Frowe (2001) deduced that human's thoughts and beliefs are constantly evolving due to the aforementioned factors. As a result, to suggest that a child's understanding of fluid intake, and the knowledge that exists within their mindsets is impacted by these issues would be rational deduction. This is due to the fact that many of the questions within this study could take a subjective view from the research participants, such as "Who tells you when to drink?". Due to the open-ended style of this particular example, it could, in theory, return a different answer from each of the Reception children, because each participant could have

different social and cultural circumstances that influence their consumption of fluids. Therefore, this study accepted this realist ontological approach. To address particular ontological issues, the research segmented the statistically significant data ($p<0.05$) into distinct sub-groups (gender, age by year and months born, and school location). This will allow the researcher to minimise the social, cultural and economic differences within the whole data to formulate conclusions and recommendations within the discussion.

### *3.1.1 Comprehending Interpretative Epistemology*

It is suggested by Scotland (2012) that epistemology is fundamentally the discourse of how the knowledge of what we already know is accrued and formed through life. Cohen, Manion and Morrison (2018) continue to elaborate that there are various types of epistemological research, two prevalent theories being interpretivist and positivist. They state that an interpretative researcher accepts they are a fundamental part of the researching process and hence, can create a subjective aspect to a study. This in turn can elicit issues with other researchers if they were to attempt to reproduce the findings due to the issue that different researchers have different social, cultural and economic backgrounds, thus influencing their individual interpretation. However, Frowe (2001) would argue that without this form of research, it may be the case the language would never have been 'interpreted' to essentially allow research to commence and be disseminated. This is due to Crotty's (1998, p.43) insight when he defined the naming of a tree, "We need to remind ourselves here that it is human beings who have constructed it as a tree, given it the name, and attributed to it the associations we make with trees". This suggests that without interpretative research within the social facet of language creation, it could be conveyed to be impossible to research entirety due to implications of transferring knowledge via written or oral language itself. It is consequently important to acknowledge this form of

epistemology, to explore what paradigm this thesis falls into. This study uses the interpretative facet when interpreting the question of 'Why Reception children think drinking is important', as these views hold wholly subjective, ideological viewpoints. As a result, it is important to acknowledge that the quality of the Reception children's replies to the questions in the research is entirely dependent on their interpretation and understanding of the world, while also the researcher's comprehension of their answers is reliant upon this epistemological factor.

### *3.1.2 A View on Post-Positivist Epistemology*

Continuing this theme, Scotland (2012) continues to suggest that positivist epistemology refers to the objective nature of research; whereby, the researcher is detached and unbiased with their findings when creating conclusions. This is due to these assumptions being informed by data alone and the specific circumstances surrounding the data. Ashby (1964) implies this paradigm of research more closely aligns itself to a quantitative, numerical style of research that allows for the statistics to produce deductions independently. Moreover, he elaborates that this is specifically useful within educational research because positivist research is based on simply facts and numerical data, as this can allow for potentially more conclusive findings that may relate to a wider populous, for example school children. Thereby, making research fundamentally more acceptable to policy makers due to the greater ability to quantify the study and generalise the figures on a local, national or international scale.

However, Popper (1959) introduced the idea of 'post-positivism', stating that instead of a researcher having a completely detached role within their study, a post-positivist researcher accepts that the background, knowledge and personal beliefs of

participants could have some impact within the study's overall findings. It was deemed necessary for this study to adopt this approach, as the researcher played a role within the data collection process, mostly due to the participants age, and their general inability to read fluently to comprehend the questionnaire. Subsequently, Creswell (2009) suggests the extent of researcher involvement within this approach is not as important as interpretive research due to the critical aspect of subjectively interpreting the responses of the participants. Consequently, post-positivism complements the empirical quantitative data because of the knowledge and expertise of the researcher. It must therefore be recognised that this researcher's understanding of phrasing questions at the age appropriate level could have an effect on the overall results of the research. However, possessing knowledge of conversing with children of this age could be conveyed as a useful addition to the study, as this assisted the children with their understanding of the questions. Creswell (2009) continues to imply that in addition to positivists, post-positivist researchers pursue to comprehend the associations between certain facets of life, but also seek to obtain the personal views and beliefs of the participants to enrich the study.

This research encapsulated a 'post positivist-realist' paradigm. It utilised a quantitative approach to data collection methods through a questionnaire that was verbally shared and recorded, along with some subjective facets; whereby, the subjective characteristics formed quantifiable results. Groff (2004) specifically justifies this approach from an educational perspective; whereby, he suggests to conduct research via similar models, is to do so in a child-centred manner which respects the thoughts and beliefs of the children within research studies, but also allows for firm conclusions to be made to inform future pedagogical practice, policy and research.

### *3.2 The Settings and Sampling*

During January and February 2019, 130 four and five year old children from four state funded schools within the South East of England participated in the study. This was primarily because of the time available to the researcher. In light of the literature review, the rationale for focusing on children's understanding, rather than adults, was simply because one can make deductions of the quality of teachers and care givers' understanding via the quality of the children's knowledge. The four schools were selected on a socioeconomic basis, via their cohort percentages in regard to 'Pupil Premium' funding. Pupil Premium within England and Wales is additional funding allocated directly to schools if individual children within their establishments meet certain criteria (DfE, 2018). Schools receive this additional funding if a child: has an annual gross household income of less than £16,190; their parents or guardians are in receipt of particular state benefits (for example: Job Seekers Allowance and Employment Support Allowance); is a child under the care of the state; or has qualified for this additional funding at any time within the last 6 years. The amount of additional funding each primary school receives is £1,320 per qualified child. Subsequently, School 1 and 4 both had a whole school Pupil Premium percentage of 10%, School 2: 23% and School 3: 36%.

As a trained primary school teacher whom has spent 6 years within various Reception settings, both as a trainee teacher and a teaching assistant, the researcher was able to utilise the links established over this timeframe, to gain initial access to the settings. Hammersley and Atkinson (2007) suggest that a familiarity with particular establishments can enhance the likelihood of initially entering research environments. This, in turn, can create more enriched research because the gatekeeper at the schools are more likely to trust the legitimacy of the research. This ultimately could have helped build a wholesome and

productive rapport with the children due to the schools' familiarity with the researcher. Colonnesi et al., (2017) implies that building a rapport with research participants can assist with the undertaking of research, as this allows the participants to feel more comfortable, and consequently return more accurate results. At all four of the schools, the gatekeeper was the Reception year leader, whom consequently oversaw the running of the research within each establishment. The University of Sheffield (2018) suggest in their advice on consent and the role of the gatekeeper, that any researcher carrying out studies where children and vulnerable people are participating, that a researcher must be guided by the requirements of the gatekeeper in research settings. Therefore, for this study, all requirements of written consent from the gatekeeper (Appendix 3) and verbal assent from the children was adhered to.

The children were then selected via a form of opportunistic selection, whereby all the children were allowed to take part in the study. Hwang (1989) suggested in his use of the opportunistic selection method, that this is a beneficial approach because if something is known or believed on this 'random' basis, then we can assume that this same knowledge or belief could be known elsewhere within the wider population. Thomas (2017) adds to this by suggesting this method is useful because the only factor of whether a child got the opportunity to conduct the research, was whether they were there on the day(s) of the research, and thus could allow for a broader picture of the topic landscape. The researcher positioned himself at floor level or at a table in a corner within each of the classroom settings, so that the researcher could lower himself down to the children's eye level, to appear less threatening. The positioning within the classroom was agreed and guided by the gatekeeper within each setting. The medical study completed by Myers, Valdivieso and Kiss' (2009) suggests that participants whom are comfortable in familiar settings can

produce more accurate results, as they are less stressed. Therefore, this approach could be considered beneficial for this study, as basing the research directly in the children's familiar settings could reduce the appearance of 'laboratory' style conditions. Consequently, allowing the children to feel more relaxed within their learning habitats. As such, in the view of Myers et al., (2009) this can return more reliable and valid results. The activity was introduced to the children as a whole cohort by their class teacher. Additionally, the children were mostly able to approach the researcher to make any further enquiries. This ensured that all children were able to access the research and be provided with the opportunity to approach the researcher if they wanted to take part. Furthermore, on this opportunistic basis, to make the best use of research time, the researcher unobtrusively approached the children whilst they were conducting other independent learning activities. This was to ascertain whether individual children who were too busy or shy were given ample opportunity to take part. The option to decline and withdraw at any stage was explained to all children. Consequently, the University of Sheffield (2018) states it is imperative to give this option of refusal, as it is crucial for ethical practice. As such, this offer was made available to all children, whether they asked the researcher about the study or researcher approached them personally. Five children chose to not partake within the study when approached because of outside influences regarding their play, where they did not want to pause their learning activities.

A potential total of 217 children could have been questioned, as this is the entire size of the four settings cohorts combined. However, due to the fact there was only one researcher, and the limited time available in each setting, not every child could participate. School 1 elected to give the researcher two whole school days in the setting, school 2 allowed two afternoons to conduct the questionnaires, school 3 offered a series of four

afternoons to coincide with the Reception phase's planning, preparation and assessment time (PPA), while school 4, similar to school 1, also offered two whole days to conduct the research.

### *3.3 The Participants*

Over the course of the researching period, 130 Reception age children elected to take part in the research (See Table 1). The participants were already split up according to age by year; however, Trost (1986) suggests a researcher can further segment the participants by other means. The Reception children were further split via: gender, age by month born, and school. The rationale for this segmentation of the data by specific month is because in the Development Matters Framework (BAECE, 2012) there are different month categories in which children are assessed, whereby one set of assessed criteria is 30-50 months, and another is 48-60. As such, this segmentation supports Sibley and Etnier's (2003) claim that children of the same age are cognitively different and are at various stages in their learning. Additionally, due to the fact that in England, children can start school the September after their fourth birthday, this led to the issue that some children born in July or August would have just turned four years of age when they started school. This is opposed to the children born in September or October, whom due to being nearly a year older when they commenced their school lives, they would have gained almost a year's worth of additional life experiences and thus may have developed extra hydration prompts. This factor may have potentially created an additional barrier for the children born in July or August in regard to their understanding of fluid intake when compared to their older peers. As such, the age data was split up into 3 categories, children born in September – December (5 years old, over 60 months), January – March (4 or 5 years old, from 48 – 60

months) and April – August (4 years old, up to 48 months). When analysing the data, this could be one variable in the quality of their current understanding of fluid intake. Additionally, due to the issue that half of the research schools selected are based within Margate in Kent (Schools 2 and 3), which has one of the most socioeconomically deprived populous' in the country (Kent Public Health Observatory, 2016). It has been reported that children from such deprived areas can demonstrate a 12 month delay in physical readiness for schooling (Ofsted, 2014), hence this could indicate a potential lack of understanding and knowledge associated with their fluid intake.

| | **School 1** | **School 2** | **School 3** | **School 4** | **Totals** |
|---|---|---|---|---|---|
| **Total Children** | 38 | 22 | 59 | 11 | **130** |
| **Boys** | 22 | 5 | 30 | 6 | **63** |
| **Girls** | 16 | 17 | 29 | 5 | **67** |
| **4 Years old** | 27 | 14 | 32 | 10 | **83** |
| **5 Years Old** | 11 | 8 | 27 | 1 | **47** |
| **School Pupil Premium** | 10% | 23% | 36% | 10% | **-** |
| **Born Sept – Dec (5 years old)** | 9 | 8 | 23 | 1 | **41** |
| **Born Jan – Mar (4 or 5 years old)** | 12 | 7 | 9 | 2 | **30** |
| **Born Apr - Aug** | 17 | 7 | 27 | 8 | **59** |

| | | | | | |
|---|---|---|---|---|---|
| **(4 years old)** | | | | | |

Table 1 – Participant demographics.

### *3.4 Sample Size*

It is stated by Cohen, Manion and Morrison (2018) that obtaining a large sample size can be a difficult task, although they propose that the larger the sample size, the more valid the research. They continue to state that a minimum of 30 cases must be researched per variable. Therefore, with the main variables in this study pertaining to whether the children are: male or female; four or five; born between certain month brackets; or school location; have no more than four sub variables within them. Therefore, this leads to the deduction that as long as there was at least 120 cases in the study, this would satisfy Cohen, Manion and Morrison's (2018) requirement of 30 cases per variable.

However, it must be acknowledged that Borg and Gall (1979) previously suggested that studies that are planned to be 'correlational to literature research', it is essential that the sample size be no smaller than 30 cases. This is because at this point, the data can induce general population deductions from the research sample. Furthermore, Gorard (2003) implied, that the greater the variability of the findings, the larger the sample size should be. Seeing that the research is potentially quite variable due to the broad intention of establishing the current knowledge of Reception age children and their fluid intake, it therefore gives rationale for a subjectively large sample size. In Bonnet et al's., (2012) study they classified their 'large' fluid intake-based research with 529 participants, making their work over four times as big. Moreover, Edmonds and Burford (2009) regarded their

work as ‘small’ with 58 participants. This thesis research study could therefore subjectively be considered as ‘medium’ size research, as it falls somewhere between the two.

### *3.5 The Questionnaire*

To initiate the creation of the research questionnaire, the matrix of planning research (Biddix, 2017) was utilised to allow the researcher to ask the most poignant questions that relate most effectively to the research statement. To collect the data, only a Google form questionnaire was utilised with the children on a 1:1 informal basis within their individual classrooms. The primary reason as to why the research was only carried out as a face to face questionnaire but was recorded in an online document format, was due to following previous research methodology by Coppinger and Howells (2019). They encapsulated a broader age range of children’s views on fluid intake, and also only utilised a questionnaire. This research is a similar study, pertaining to a more specific year group could employ virtually a parallel methodology. Additionally, because of the researchers own teaching experience, it was decided to be a necessity to conduct the questionnaire on this face to face basis. Primarily because the Reception children would be too young to read and comprehend the subjectively complicated questions themselves. As such, it was concluded to be more beneficial by the researcher, as he was able to use age appropriate language to pitch the questions at the appropriate level according to the children’s understanding. As such, the questionnaire set out a foundation of pre-planned questions, to ensure each question was phrased the same way for each participant. Louise-Barriball and While (1994) suggest that this must be the case to ensure validity in the research, because if a question is phrased differently, or the tone of the researcher’s voice changes between the participants, then it could create different responses from them, and thus augment the

quality of the findings. As a result, it must be denoted at this point, appendix 4 is what the children would have seen if they were answering the questionnaire independently. Whereas, appendix 5 is the format that the researcher used to complete the study to help with the ease of completion of the questionnaires and the data analysis process.

As can be seen in the questionnaire in appendix 4 and 5, the way these questions were formatted was via Biddix's (2017) framework of crucial characteristics of a good research question. Although this framework aligns itself towards a research question in the broad sense, it can be used to format individual questionnaire queries. For example, in appendix 4 and 5, question 12, it states "Who tells you when to drink?" The framework denotes that a question must be feasible, clear, significant and ethical. The response in relation to those requirements, and this study's overall imperatives was, yes. The questionnaire subsequently utilised various styles of questions, such as multiple choice and the Likert scale. Likert (1932) and Cohen, Manion and Morrison (2018) both suggest that these 'rating questions' are useful to allow for a definitive articulated response from participants. This was used to good effect within question 6 to ascertain whether the children never, sometimes or always become thirsty after lunch. Cohen, Manion and Morrison (2018) also state that a selection of open-ended questions can allow for a broad range of responses from the participants. For example, in appendix 4 and 5, question 7, it asked what the participants were doing at lunchtime if they become hot and thirsty. This allowed for an array of answers to be given, while also demonstrating the participants understanding that physical activity can produce a thirst response to have a drink due to the loss of bodily fluids.

Conversely, in queries 8, 8a, 9 and 10, the research utilised closed multiple choice questions that allowed the children to demonstrate their knowledge of the quantity of water they believed they are and should be drinking. This established whether the children knew this crucial information, and could be comparable to global recommendations (WHO, 2004). Additionally, question 15 asked the children that if they were thirsty, would they have a drink and then play with the toys or play without liquid refreshment. This established a definitive answer as to if the children were given agency to their own consumption of water in the classroom setting, would they listen to their own bodily needs or simply ignore it for extra time to play with toys.

As additionally suggested by Sutton et al., (2003), it is possible to plan questions via a medium of 'planned possibilities' to ensure structure of the questionnaire is effective and the overall research statement gets elaborated on. As such, this research created questions that enabled the children to comprehend what was required of them by wording them carefully in an age appropriate manner. As a result, within the EYFS (DfE, 2014), it states that teachers must ensure they phrase instructions in a way that enables children to comprehend what is being asked of them. Due to this, the research has taken advice from this to enable the fundamental understanding in which to conduct and phrase the questionnaires. For example, the use of 'consume fluid' was omitted from the questions and replaced with the phrase 'drink water'. As such, the research provided options, unseen by the participants (Appendix 5), within the open questions to allow for specific answers to fit into a particular generic field of 'possibilities', for coding and data analysis purposes. For example, in appendix 4 and 5, questions 5, 5a, 7, 11, 12, 13, 14 and 16, it asked an open question to allow for breadth of answer; however, the researcher applied his school experience to establish a large array of potential replies. To reiterate, this could not be seen

by the participants to facilitate the field of 'possibilities'. Additionally, if a retort had not been thought of by the researcher, the function to record the open questions by manually writing the replies was also present.

The face to face questionnaire followed a strong emphasis towards quantitative data collection methods. It additionally utilised some questions that could be considered as qualitative but phased and created in a way that allowed the queries to be coded, to quantify the thoughts and opinions into raw numerical data. Rolfe (2006) suggests in his analysis of qualitative research, that quantitative and qualitative research could be argued as being diametrically opposed. As one facet is aiming towards the figures, while the other is an interpretation of why the figures represent a certain way of humanistic thinking. This viewpoint is useful to denote but as Creswell et al., (2007) insinuate, both paradigms in the academic research sphere can be utilised to accommodate for broader findings to take place. This is due to the fact that both facets of research can allow for different viewpoints to materialise. This led to the deduction, and supports Clark and Moss' (2011) suggestion, that listening to the children's wider views can be of benefit for this study, because they could express an opinion more effectively when asked an open question. One aspect covers the physical data in a factual sense, while the other can pay dividend to the opinionated interpretation of that factual information. Thus, in turn enabled this research to gather qualitatively why the children thought drinking was important but also quantitively how their knowledge behind the consumption of it differs.

As aforementioned, a selection of open questions were utilised, rather than just specifically evaluating the children's current knowledge surrounding the topic in a right or wrong sense. Thomas (2017) suggests that this process allows for qualitative research data

to fundamentally become quantitative, and in turn allows for the benefits of both fields of data collection. Essentially, this has been done to allow for the ease of completion of the questionnaires, while also assisting in the analysis process at the culmination of the study to satisfy the post-positivist realist approach to the research. Furthermore, Thomas (2017) also suggests that the data from these questionnaires can then be triangulated together to form a concomitant structure with an embedded design of analysis. Essentially, Creswell and Plano (2007) state that quantitative data can be used as the primary source of information for examination and analysis, but on the side can use features of qualitative data in a supportive capacity. This can be seen in question 5a, where the questionnaire asked, "why do you think drinking is important?". This allowed the numerical records to be elaborated further within the critiquing process, as each type of response was coded to a particular answer. Creswell and Plano (2007) continue to denote that this process allows for more explicit and thorough research to be conducted, and as such, is the format of methodology for this study. Driscoll, et al., (2007) however suggest that this process is perhaps not always the best course of action, because it provides the worst of both worlds, and in turn creates a final analysis that insinuates findings that may not actually be present. However, in Tashakkori and Creswell's (2007) view, this type of approach can assist participants to elaborate on this thought process. Therefore, it was ultimately decided that this concomitant process of the triangulation of quantitative data supported with the qualitative nature of open questions, which is empirically analysed data was the most useful method for this study.

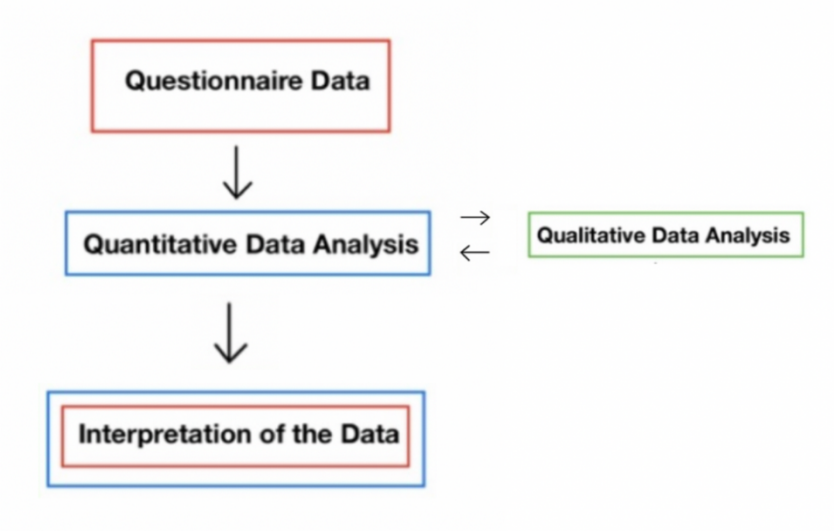



Figure 1 – Data Analysis Methodology Flow Chart: Primarily quantitative data utilised but qualitative open questions were coded numerically to help analyse the whole data set.

### *3.6 Data Collection Procedures*

Before any research was conducted, schools were contacted directly by E-mail to be allocated time by the institutions as to when the researcher could access the settings (Section 3.2). Consequently, a morning was spent acclimatising within each setting due to the participants age, to allow the children to familiarise themselves with the researcher. This is because, Colonnesi et al., (2017) suggest that some young children become very quiet and shy when coming into contact with a person whom they are unaccustomed to. While also in the view of Colonnesi et al., (2017) due to the researcher spending time in each setting before the commencement of the face to face questionnaires, it allowed the children to become comfortable with the researcher and gave better flexibility in how the children viewed him to answer the questions. However, this could create another set of problems and hence it must be acknowledged, that the writer of the research is the person conducting it. Cobb (2016) states this factor can cause an influence over the results because the researcher can phrase questions differently or change their tone of voice to obtain a particular answer. As such, it was ensured that the same phrasing and tone for each child

was utilised. Moreover, Goodwin et al., (2017) suggest due to the fact that the children are aware they were being questioned, the potential for the Hawthorne effect could be present (Landsberger, 1958). Whereby, the participants could alter their true responses to please the researcher. However, due to the age of the participants, it could also be argued that the children needed someone familiar to ensure they answer the questions accurately and appropriately. As a result, it is implied that conducting the research in this manner was of paramount importance.

As previously mentioned, while conducting the research within the four schools, five children elected to not take part in the study because they were pre-occupied in their child-initiated play.

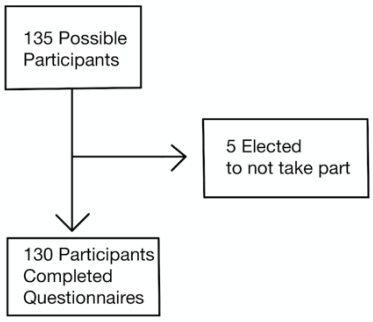



Figure 2 – Possible Participants Flow Chart

Face to face questionnaires were more beneficial, as opposed to group studies, because as Colonnesi et al., (2017) suggest that some children are shy towards adults they do not know. As a result, group studies could have been used to amass a larger sample with the limited time available. However, due to the age of the participants and the somewhat subjective view that some children are shy towards adults they do not know (Colonnesi et

al., 2017), this was not selected as the most beneficial method in gaining the most accurate data possible. Furthermore, in her narrative review on the topic, Bowling (2005) suggests that the way a research questionnaire is administered is vitally important to the overall findings of the study. They state that when one carries out a 1:1 questionnaire, that although possibly intimidating at first for the participants, it curates the most accurate results. This is because as Bell, Bryman and Harley (2018) suggest in their research methods text, the answers are coming from the participants own pre-conceived ideas and not influenced by anyone else. This in turn leads to the conclusion that for the purpose of this study in particular, the research was trying to ascertain a grasp on individual current knowledge and not the general understanding as a small group. As such, due to the researcher familiarising himself with the Reception children before commencing the 1:1 informal questionnaire, it was deemed to be the most beneficial method to gather the highest quality of research.

Due to the age of the young participants and a potential for a lack of understanding of metric measurements, the use of visual bottles and a toy dinosaur were implemented to assist the children to demonstrate to the researcher how much water they thought they are and should be drinking on a daily basis (see appendix 6). Corso, Hammitt and Graham (2001) suggest the use of visual aids is beneficial because it allows for greater depth in understanding questions. Bagnoli (2004) continues to specify in her research, that utilised visual cues to allow participants to see pictorial prompts in regard to their own past, present and future is useful. She also suggests that using these prompts elicits more profound responses than when she did not use them, as the applicants were visually stimulated to give a more detailed answer. As such, within appendix 4, question 15, it asked about a child's preference in regard to if they were thirsty would they drink water before playing with toys, or play without liquid refreshment. Although, the water bottles were used

elsewhere in the research, as can also be seen in appendix 6, a toy dinosaur was used to depict the option of 'play with the toys without drinking'. This was deemed in the professional opinion of the researcher to effectively symbolise this particular thought construct, and thus assisted the children in the same manner that the visual water bottles did earlier in the questionnaire. To this end, using physical bottles of water with the Reception age participants, not only allowed the children to more greatly understand the questions being asked of them, but hopefully permitted the child participants to 'see' they were talking about water. Additionally, it was made aware to the children the bottles had the same amount of water in them as their own bottles in the classroom to increase comprehension of the questions. Hence, with the bottles displayed, it could have created more definitive feedback. Drawing upon previous work by DeMyer et al., (1972), they suggest that by using visual stimuli, in this case physical bottles, it allowed the children to physically answer some of the questions. They state that it allows a non-verbal child to simply point to an answer, rather than dictate it, thus accessing what was being asked of them, and hence allowed an inclusivity to this research, that not all research permits.

### *3.7 Ethics*

Before commencement of the study with the Reception age participants, ethical approval was obtained from the Faculty of Education Research Ethics Committee (FREC) at Canterbury Christ Church University (Appendix 2). This ethical approval had to be acquired because of the age of the intended participants and the potential for influencing their ideas, while also ensuring the safety of the children. Alderson (2005) would suggest that ethical clearance needed to be achieved to ensure the research is legitimate, so that the children are in a safe environment when conducting the research, and that the questions themselves are age appropriate. The British Educational Research Association (BERA,

2011) state that all data collected must be protected on a secure server and any names titled within the research must be anonymised. Subsequently, this was done to ensure all identities and integrity of the participants were safeguarded. For this study, schools were numbered one to four and individual names of the Reception children were not recorded, to ensure confidentiality of their responses. Additionally, the Google form questionnaire that was created, and the proceeding raw research data were securely stored on a password protected computer, to ensure only the researcher had access. The Economic and Social Research Council (ESRC, 2015) continue to state that it is not always necessary to receive individual signed consent from children themselves if gaining this signed consent from the participants could be problematic (Appendix 3), however verbal assent is always required. As such, Cohen, Manion and Morrison (2018) suggest that as long as the gatekeeper (Headteacher or Senior Teacher) deemed the nature of the research to be unobtrusive to the participants, then signed consent from themselves was sufficient, and in turn verbal assent from the children was gathered. To safeguard the anonymity of the signed consent from the gatekeepers, the hard copy versions of these consent forms were stored within a locked filing cabinet on a secure site, whereby only the researcher had access. To ensure consistency in the study, all children were read out the same set of written instructions by the researcher (appendix 7) before any questions were asked. They were asked if they would like to take part in the research, in which they were informed that to decline the offer was acceptable. It was explained to each child and to all parties playing loco parentis that they were free to withdraw from the study at any point, even if they had completed the study, and in turn, their data consequently would be deleted.

### *3.8 Data Analysis*

To analyse the overall data, the Statistical Package for the Social Sciences 24.0 (SPSS) was utilised. Specifically, Levene's (1961) test for quality variance was used to examine areas of statistical significance ($p<0.05$). Whereby, a series of univariate analysis of variance tests was carried out to establish if any of the independent variables of: age (by year and month), gender and school location had an influence on Reception children's understanding of fluid intake. Moreover, it is Field's (2017) view that to investigate the effectiveness of independent variables on dependent variables, these tests can be used to depict whether there is a statistical significance value of below $p<0.05$, as this is the figure that implies there is a 95% chance of these findings representing a wider populous. He continues to state that this is also the figure that is universally recognised within academia, to determine whether a fixed factor has a direct impression on a dependent variable. As a result, this research utilised MANOVAs to explore the data by coding each type of response and variable into a number, for example: boys were indicated as 1 and girls, 2. Additionally, the four research schools were labelled 1 - 4. Where consequently, when a child answered "don't know" to a question, this was coded as 0 to signify non-interaction with a query. The researcher was then able to process this data through SPSS with the multiple independent variables, to investigate if these fixed factors had a statistically significant main effect ($p<0.05$) on the various queries. Furthermore, the Bonferroni Post-hoc test was carried after MANOVAs. Field (2017) implies that this test is a useful commodity to reduce the chances of MANOVAs obtaining false statistical significance ($p<0.05$), and as a result increased the validity of the research. Moreover, the researcher consequently examined if any combination of the interactions also had a statistically significant effect of $p<0.05$ on Reception children's understanding and knowledge of fluid intake. It was then possible to return to the raw data, to create visual stimulating graphs and charts to comprehensively

inform the research thesis. The whole data set was then able be analysed, whereby the statistics were cross referenced with each other, and the informing literature, to advise a discussion. This in turn allowed for deductions and conclusions of the Reception children's current knowledge and understanding of fluid intake to occur.

## ***Chapter 4 – Results***

This chapter will present the findings from the questionnaire which will be separated by: the whole sample set, gender, age by year and month, and school location. It will present the findings in a visually stimulating manner by depicting them in bar graphs and pie charts.

***Children's knowledge and understanding of fluid intake for the whole day (24 hours).***

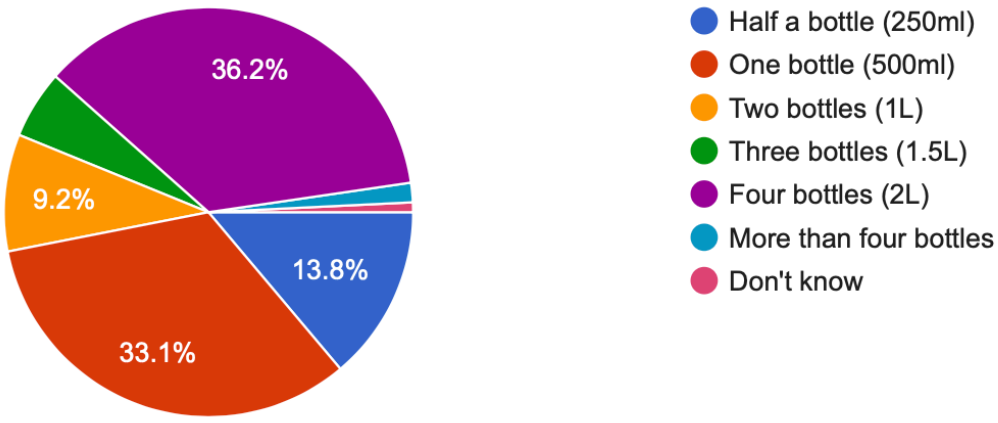



Figure 3 – Percentage values for the whole research sample for how much fluid Reception children think they drink in total a day.

The children's reported drinking throughout the whole day had great variation in their fluid intake from 250 ml up to more than 2L (see figure 3), and with some children reporting they did not know how much they drank.

There were no statistical main effects or interactions ($p>0.05$). It was found that on average 46.9% of the children believed they drank between 250 ml (13.8%) and 500 ml (33.1%) a day combined. Additionally, of the all the Reception age respondents, 36.2% felt that they consume 2 litres a day at home and at school combined. Furthermore, it was found that 9.2% of all the children thought they were consuming 1 litre a day.

***Perceived 24 hour drinking habits of Reception children when compared to WHO guidelines***

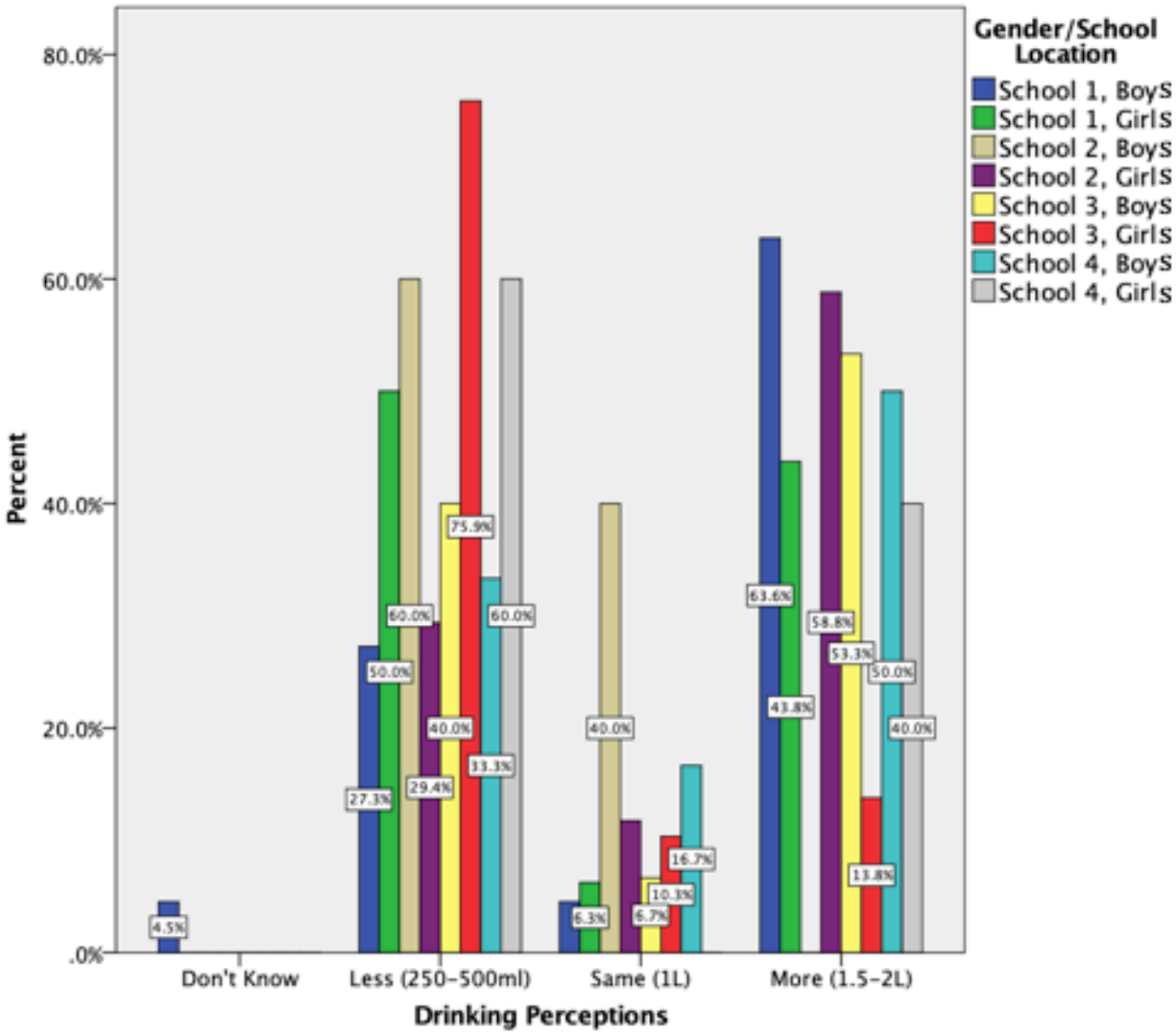



Figure 4 - Percentage values for Reception children's perceived 24 hour drinking habits when compared to the World Health Organisation's (2004) daily consumption guidelines, for gender and school location.

In further analysis, there was a *significant interaction effect* ($p<0.05$) between gender and school location for the Reception children's perceived drinking habits when they were compared to the World Health Organisation's (2004) daily consumption guidelines. It was

found that 5.9% of school 3's girls surmised they were drinking less than the 1.1-1.3L of water a day recommended by the World Health Organisation (2004), (see figure 4). It was additionally found that 60% of school 2's boys were also drinking less than what the World Health Organisation (2004) suggest, with the remaining 40% thinking they consumed the same. This is in contrast to the other sub-groups whereby they all had some representation in the perception of consuming more than what is required.

***Is there difference in knowledge and understanding on how much to drink on a daily basis according to gender and school location? (24 Hours)***

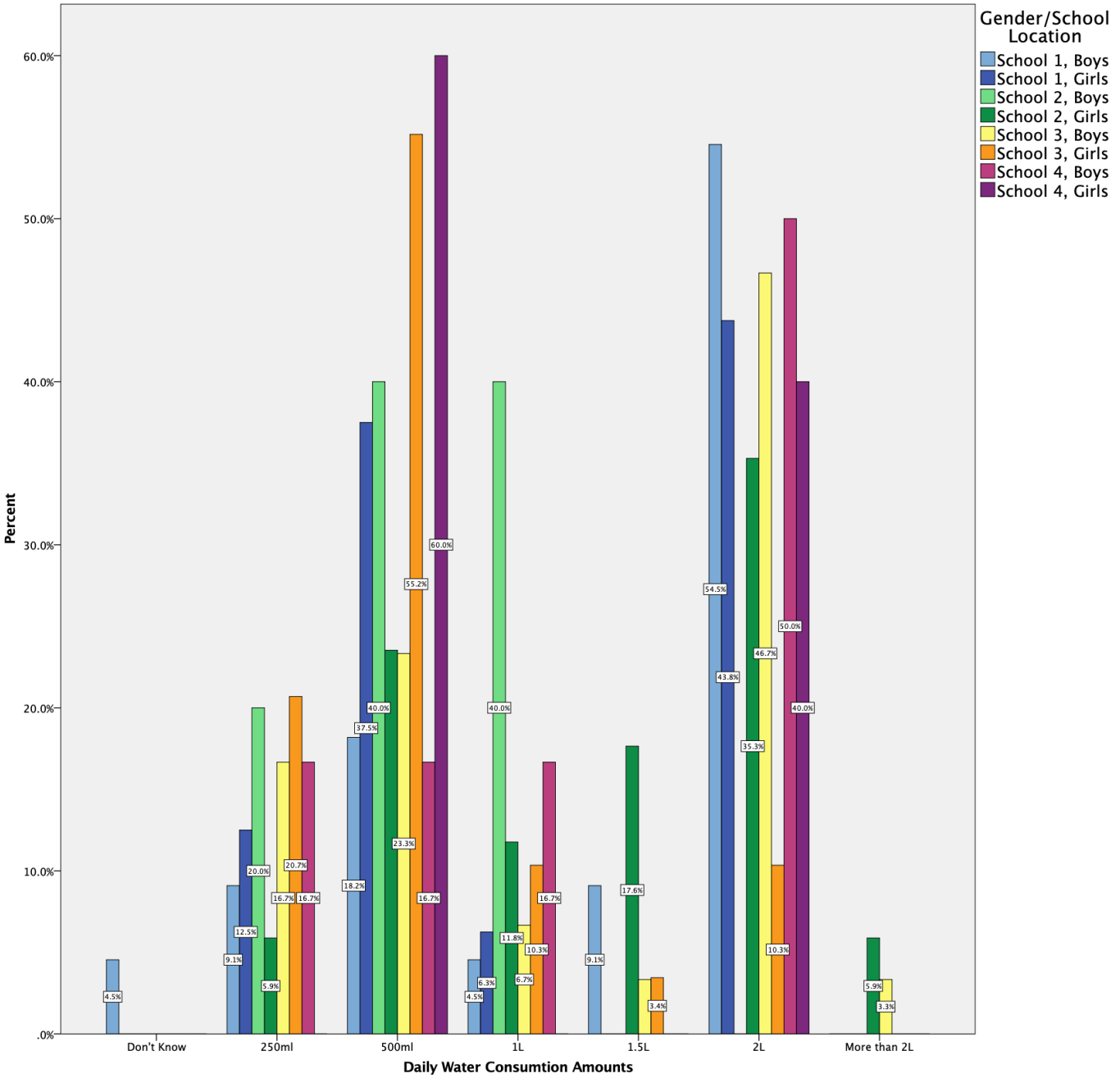



Figure 5 – Percentage values for how much water Reception children thought they were drinking on a daily basis (24 hours) for gender and school location.

There was a *significant interaction effect* ($p<0.05$) between gender and the individual school locations, on how much Reception children thought they are drinking on a daily basis. It was discovered that 50% of school 1's girls thought they were drinking 500 ml or

under a day, as opposed to 27.3% of their boys (see figure 5). This result of a higher percentage of the school's girls consuming 500 ml or under a day, in contrast to their same cohorts boys, continues with both school 3 and 4. Whereby 75.9% of school 3's girls and 60% of school 4's girls thought 500 ml or under was the amount they drank daily, as opposed to 40% of the school 3's boys and 33.4% of school 4's. However, school 2 indicated the inverse of this: 60% of their boys believed 500 ml or under was a good reflection of their drinking habits, as opposed to 29.4% of the girls.

***Children's knowledge and understanding of fluid intake within just the school day?(9:00 - 15:10)***

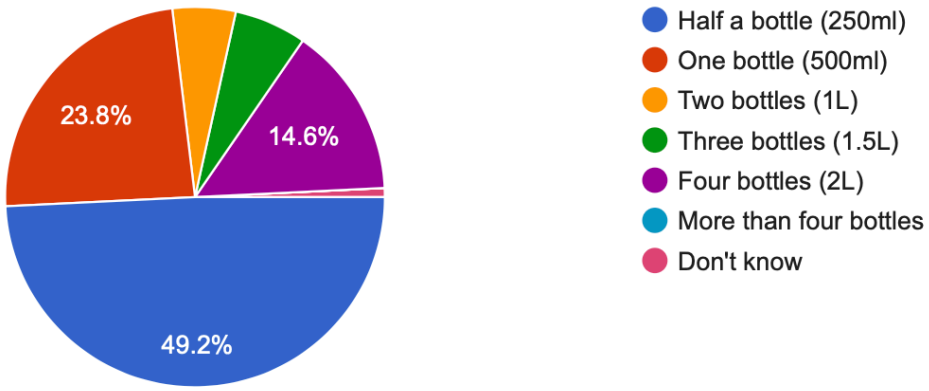



Figure 6 – Percentage values for how much water Reception children thought they were drinking at school on a daily basis (9:00 – 15:10).

There were no *significant main effects* found ($p>0.05$) for gender or school location. On average it was found that 73% of all children reported that they drank between 250 ml (49.2%) and 500 ml (23.8%) a day at school. This is considerably higher than the 14.6% of all respondents whom positioned themselves at consuming 2 litres, or the 5.4% of children whom thought 1 litre was their daily school drinking total (see figure 6).

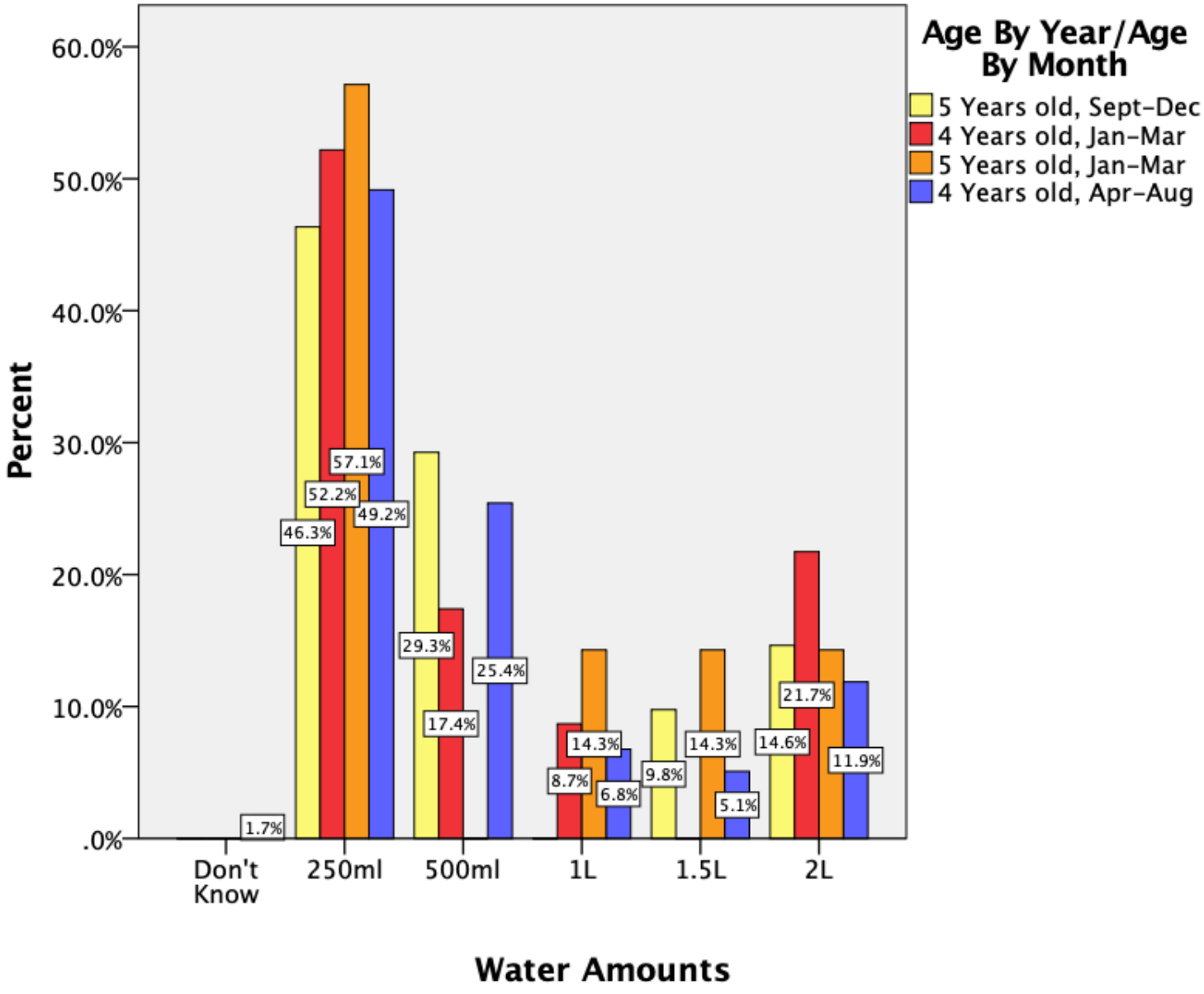



Figure 7 - Percentage values for how much water Reception children thought they were drinking at school on a daily basis (9:00 – 15:10), for age by year group and age by month.

There was a *significant interaction effect* ($p<0.05$) between the age in years and months born of the Reception children and the total amount the children thought they were drinking a day at school. None of the 5 year old children born between January and March identified

500 ml as an amount they drink at school. However, it was discovered that 42.9% of the same sub-group stated they consumed 1 litre or more a day at school. Yet, a far higher percentage of 57.1% also felt they only drink 250 ml a day. Indicating an “all or nothing” approach to their school time consumption and highlighting the confusion within this group as to how much they are drinking.

***When do Reception children get most thirsty?***

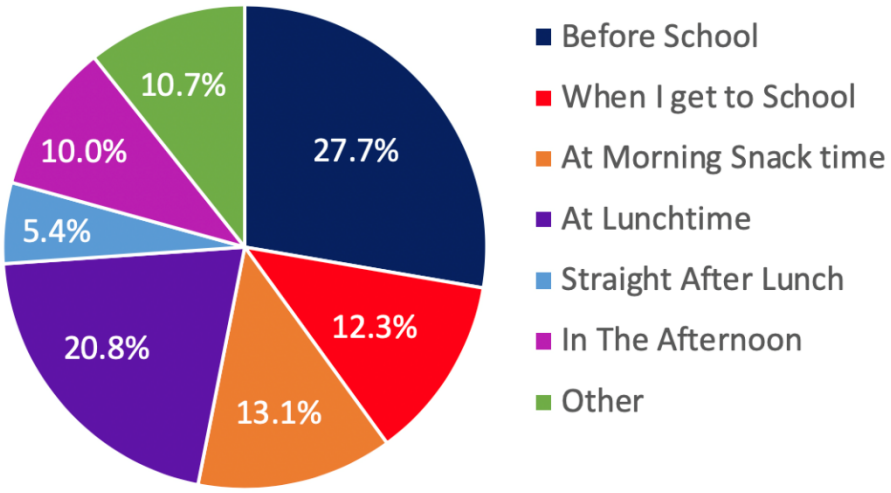



Figure 8 – Percentage values for when Reception children get most thirsty in the school day.

There were *no significant main effects or interactions* found ($p>0.05$) for when children get most thirsty, indicating that thirst is complex and variable. Overall, on average 36.2% of Reception children felt they get most thirsty during the school day: at lunchtime (20.8%), straight after lunch (5.4%) or in the afternoon (10%). Moreover, it was discovered that 27.7% of the children felt they are most thirsty before they arrive at school, where an additional 12.3% of the 4 and 5 year old children posited that they most would like liquid refreshment the moment they get to school, suggesting that 40% of the Reception children are most thirsty in the earliest portions of the day, indicating the importance of starting the day at school with a drink (see figure 8).

***When the Reception children get have their first drink daily***

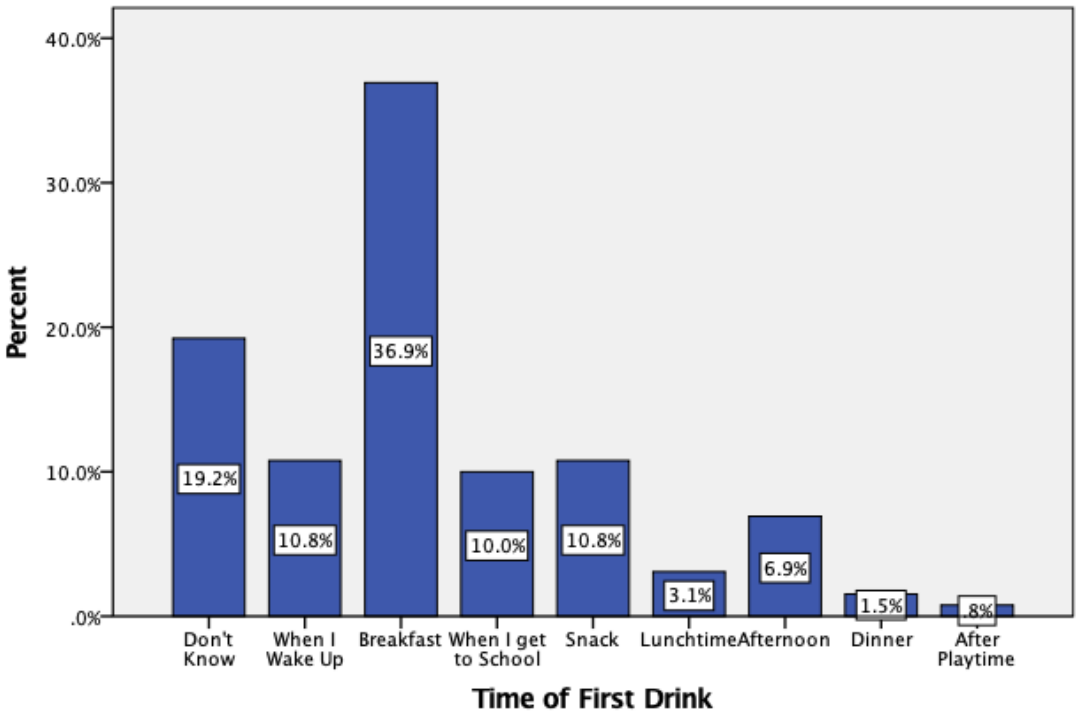



Figure 9 - Percentage values for when Reception children drink their first drink on a school day.

There were no *significant or main effects* found ($p>0.05$) for when Reception children consume their first drink on a school day. It was discovered that 47.7% of the children reported they consume their first drink everyday before school, either with breakfast (36.9%) or when they wake up (10.8%). Additionally, it was found that 19.2% of the children could not name a time they consume their first beverage. This therefore means that 33.1% of the Reception children believed they consume their first beverage while at school, again highlighting the importance of a morning drink on arrival at school (see figure 9).

***Why do Reception children think drinking is important?***

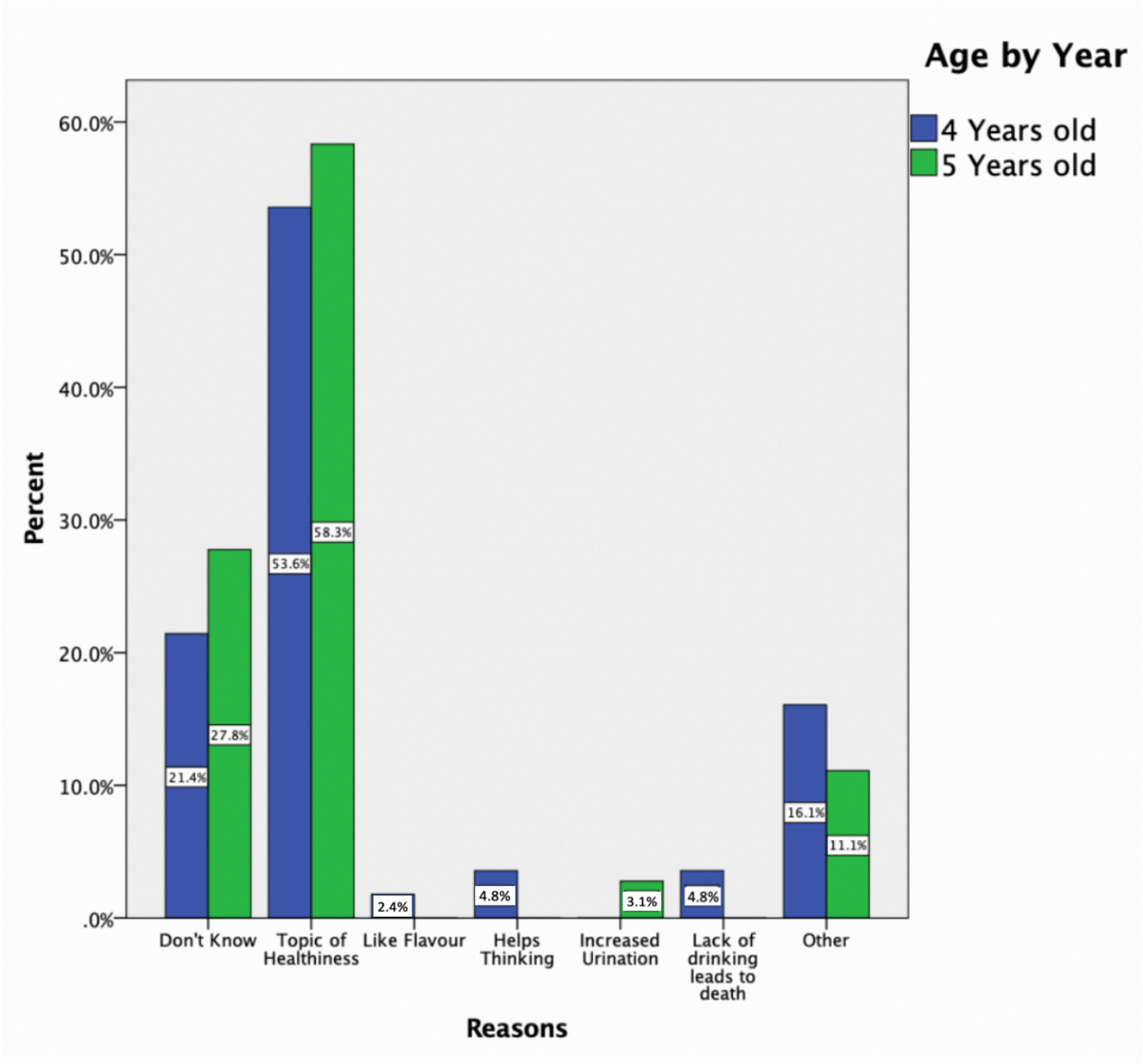



Figure 10 - Percentage values for why Reception children thought drinking was important for age by year group.

There was a *significant main effect* for why children thought drinking was important, according to year groups ($p<0.05$). It was found that 58.3% of 5 year old children believed drinking was important because it assisted them in being 'healthy', as opposed to 53.6% of 4 year olds. However, 16.1% of 4 year old children held more specific beliefs such as:

stopping headaches, body heat reduction and ensuring the continuity of hydration. This differs from the 11.1% of 5 year olds whom believed similar facets. Furthermore, 27.8% of 5 year olds could not inform the research about why they thought drinking was important, whereas 21.4% of 4 year old children were unable. Therefore, a mean average of 24.6% of all Reception children in the study did not know why drinking fluid is important (see figure 10).

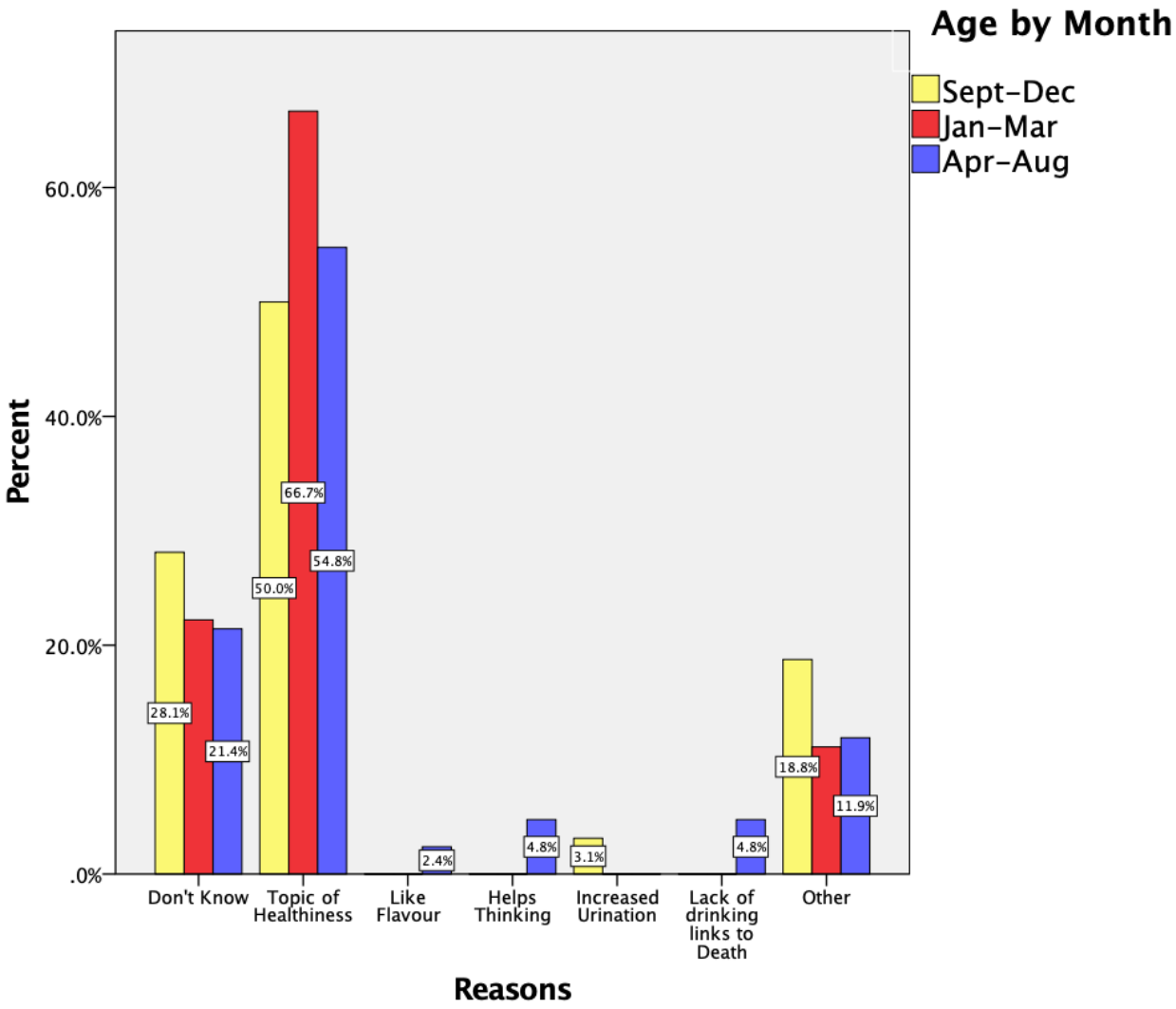



Figure 11 - Percentage values for why Reception children thought drinking was important, for age by month born.

There was also a more a specific *significant main effect* ($p<0.05$) for age by month born, in relation to why Reception children believed drinking was important. It was found that 66.7% of Reception children born between January and March held the assumption that drinking was beneficial to health. Additionally, it was discovered that 18.8% of the children born between September and December, held more of the aforementioned specific views in relation to the importance of water consumption. This is higher than both of the younger age brackets. Furthermore, when the children were asked this open question about the importance of water consumption, it is imperative to note that 4.8% of the children born between April and August felt that a lack of drinking fluid would lead to their death.

***How often do Reception children get thirsty after lunch time?***

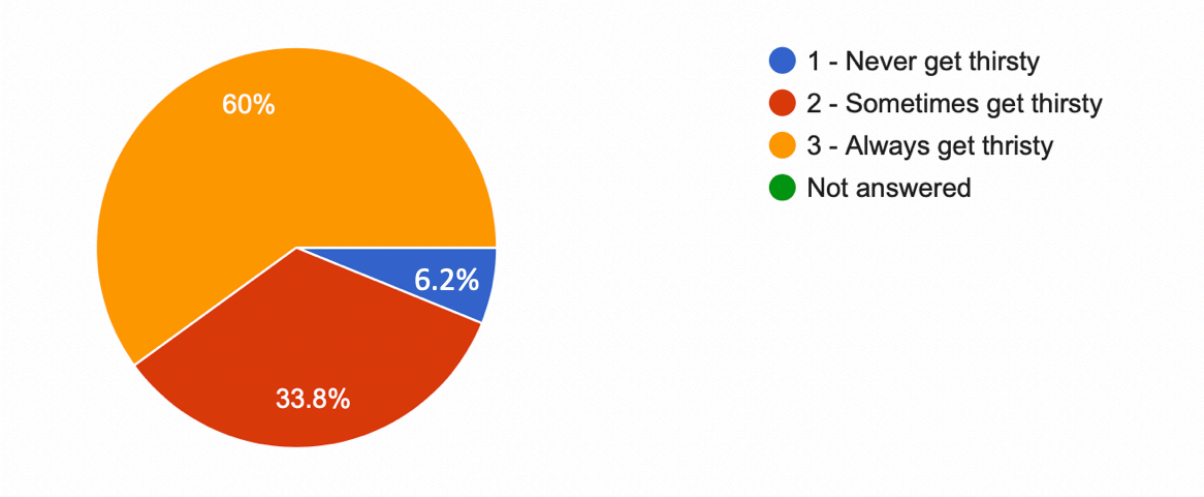



Figure 12 – Percentage values for how often Reception children get thirsty after lunchtime.

There were no *significant main effects or interactions* found ($p>0.05$). It was found overall that on average amongst the whole research sample, 60% of Reception children felt they 'always' get thirsty after lunchtime. This is in addition to the 33.8% of 4 and 5 year old children who felt they 'sometimes' get thirsty after the same period in the day. Therefore, 93.8% of all Reception children in the study felt they need additional fluid after a bout of physical activity in the middle of the day (see figure 12).

***Do Reception children recognise what makes them thirsty in their lunchtime activities?***

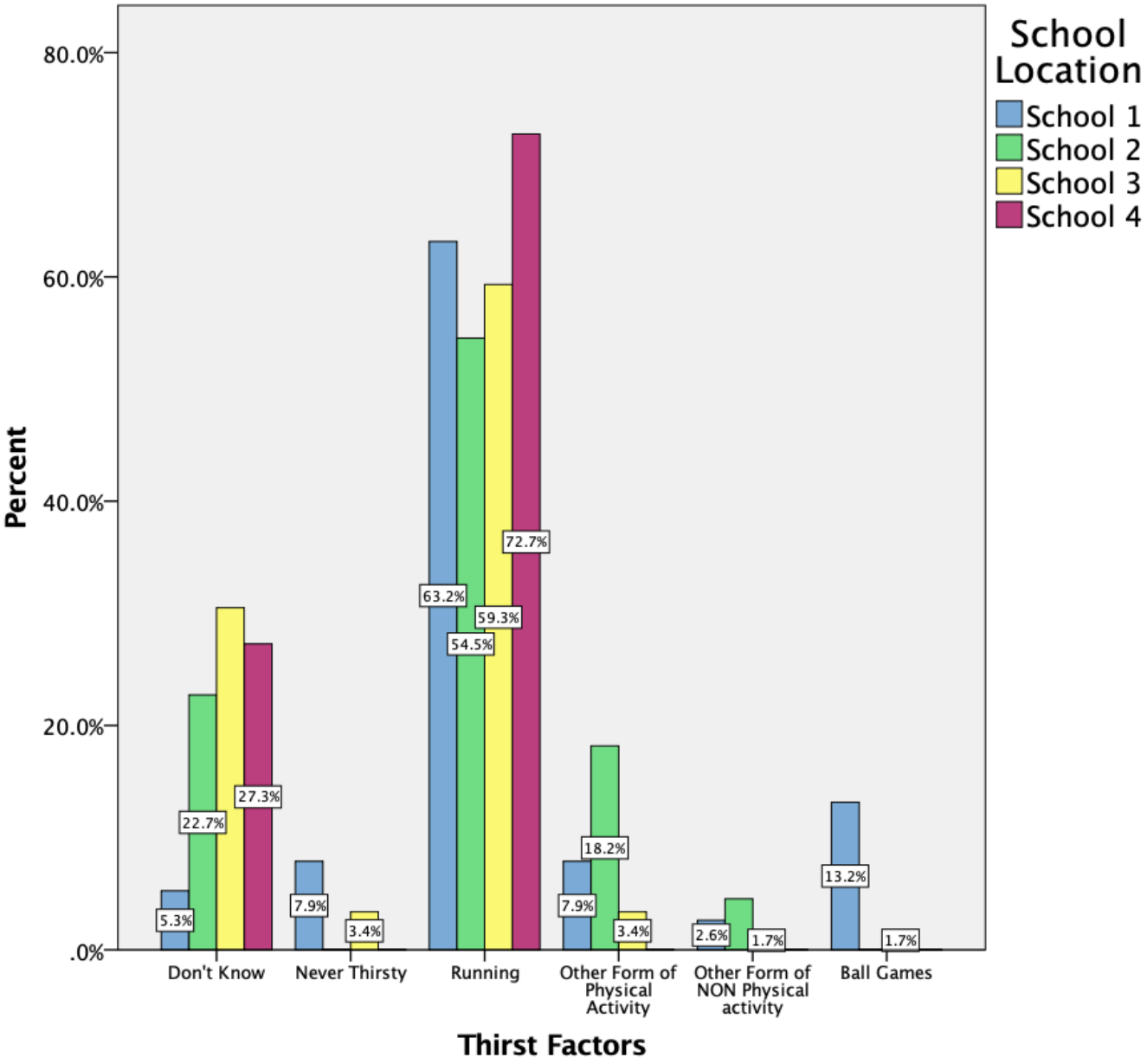



Figure 13 - Percentage values for Reception children's knowledge on what makes them thirsty during their lunchtime for school location.

There was a *significant main effect* ($p<0.05$) for school location when the children were asked what makes them hot and thirsty at lunchtime. At least 54% of the Reception children

within all settings stated that ‘running’ makes them thirsty. However, the number of children that could not describe what makes them thirsty was *statistically significant (*$p<0.05$). In comparison to the other schools, only 5.3% of school 1 could not name an activity that makes them thirsty. Therefore, indicating that 84.3% of school 1 were able to name a varied amount of thirst instigators of: running, ball games or another physical activity such as hide and seek or tag. This is in contrast to school 4, whereby they had a more ‘focused’ outlook on the issue. It was discovered that 72.7% could identify that ‘running’ made them thirsty; whereas, the other 27.3% of that same cohort were unable to name a thirst factor.

***When are Reception children allowed to drink in school?***

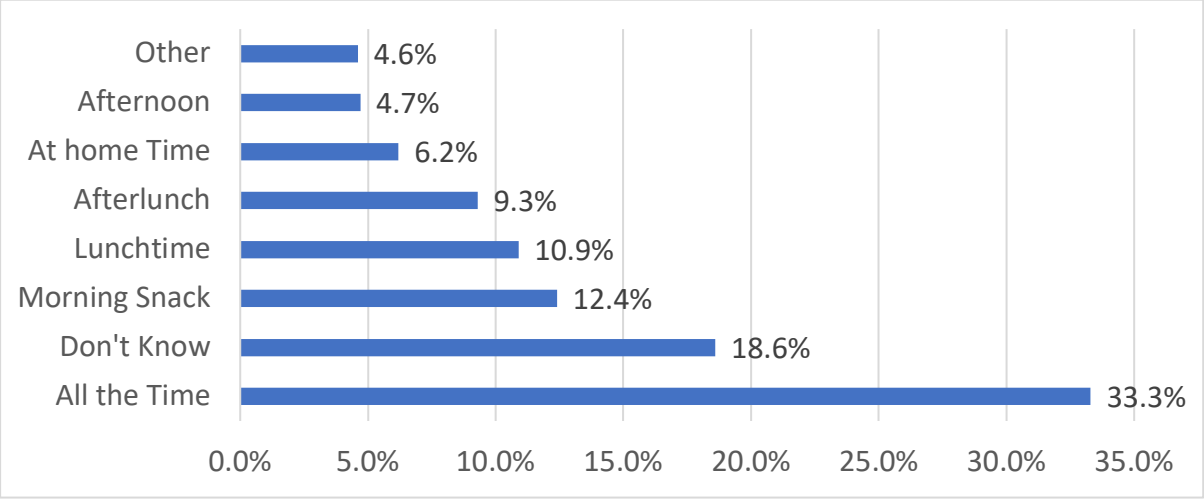



Figure 14 – Percentage values for when Reception children felt they could drink at school.

There were no *significant main effects or interactions* found ($p>0.05$) for when children felt they could drink in school. It was discovered that on average, 33.3% of the whole research sample felt they could drink at any time in the school day. However, 18.6% of the children did not know when they were allowed to drink at school. Finally, on average 24.9% of the Reception age children felt they were allowed to drink at some time in the afternoon, either at: lunchtime (10.9%), after lunch (9.3%) or generally in the afternoon (4.7%). This therefore suggests that 58.2% of all reception children felt they were allowed to drink at a time in the afternoon (see figure 14).

***When are Reception children not allowed to drink in school?***

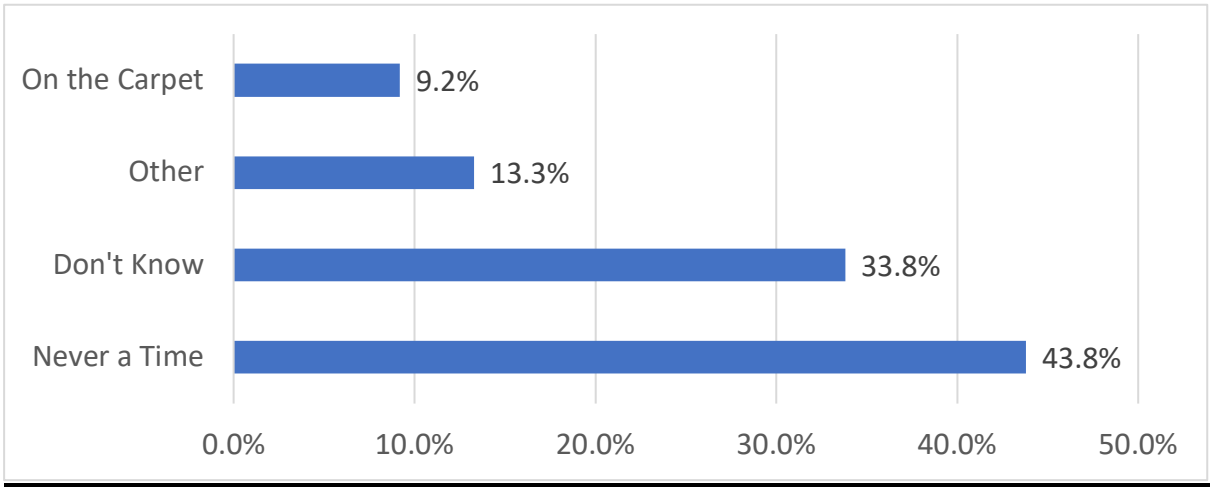



Figure 15 – Percentage values for when Reception children felt they could not drink at school.

There were no *statistical main effects or interactions* found ($p>0.05$) for when children felt they were not allowed to drink in school. It was found that on average, 43.8% of the Reception age children felt that there was never a time when they could consume water in the school day. However, 33.8% did not know a specific time when drinking was prohibited in school. This could suggest there is a lack in understanding of the school drinking rituals and practices of the classroom. Furthermore, it was discovered that 9.2% specifically felt drinking on the classroom carpet was prohibited, with an additional 13.3% attributing to various other times in the day. Most of these include a general time in the morning or afternoon, and at tidying up time (see figure 15).

***What are Reception children's favourite drinks?***

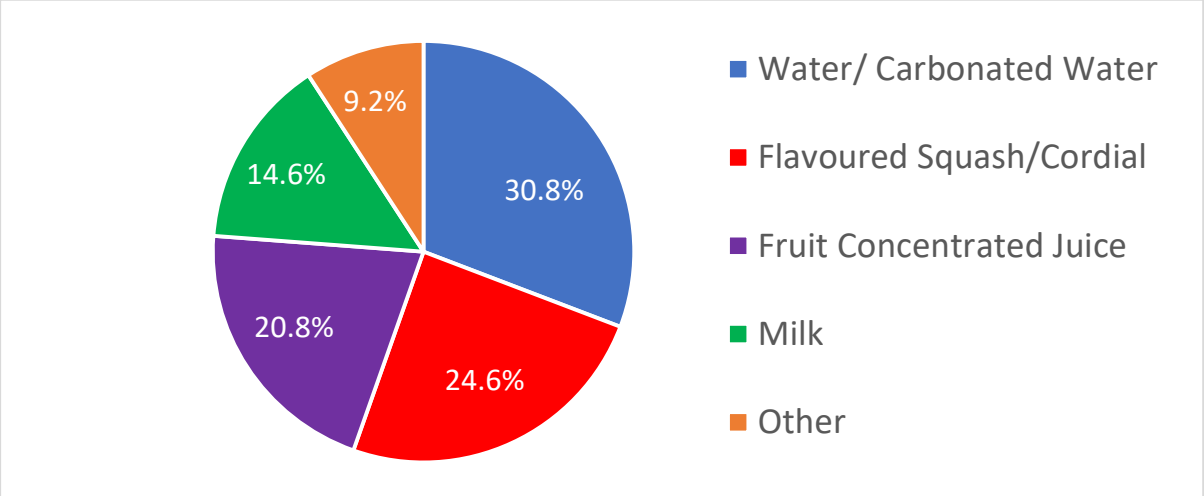



Figure 16 – Percentage values for what are Reception children's favourite drinks

There were *no statistical main effects or interactions* found ($p>0.05$) for children's favourite drink. It was discovered that on average, 55.4% of the whole sample stated their favourite drink was either water (30.8%) or a flavoured cordial (24.6%). It was additionally found that 20.8% favoured the sugary alternative of a fruit concentrated juice, for example: apple or orange juice. While an additional 14.6% preferred milk the most (see figure 16).

***Who tells Reception children when to drink?***

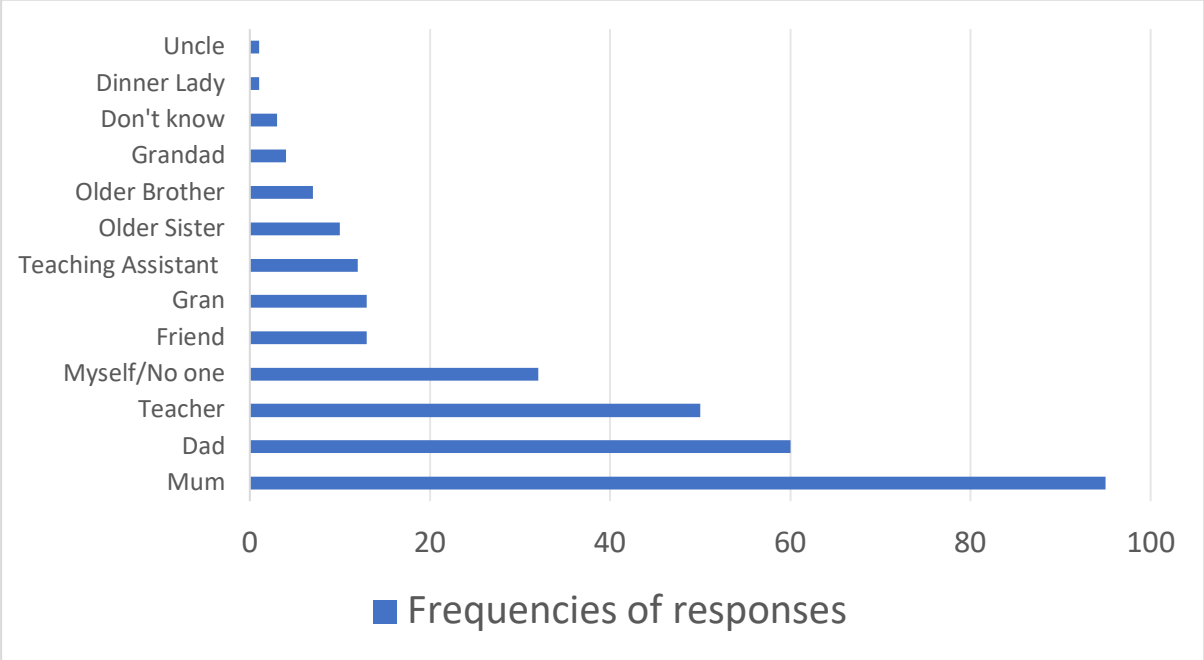



Figure 17 – Frequencies of responses for who tells Reception children when to drink.

The overall frequencies from the multi-response open question the children were asked to name all the people who tells them when to drink throughout the whole day (both home and school), they were allowed to name as many people as they could recall. It was found there was a stronger parental influence, with 95 children stating that their mother informed them when to drink. This is higher than the 63 children who mentioned all the school staff put together (Teacher: 50, Teaching Assistant: 12 and Dinner Lady: 1). The data also shows that a combination of both family members and school staff told them when to drink, highlighting the importance of both units (see figure 17).

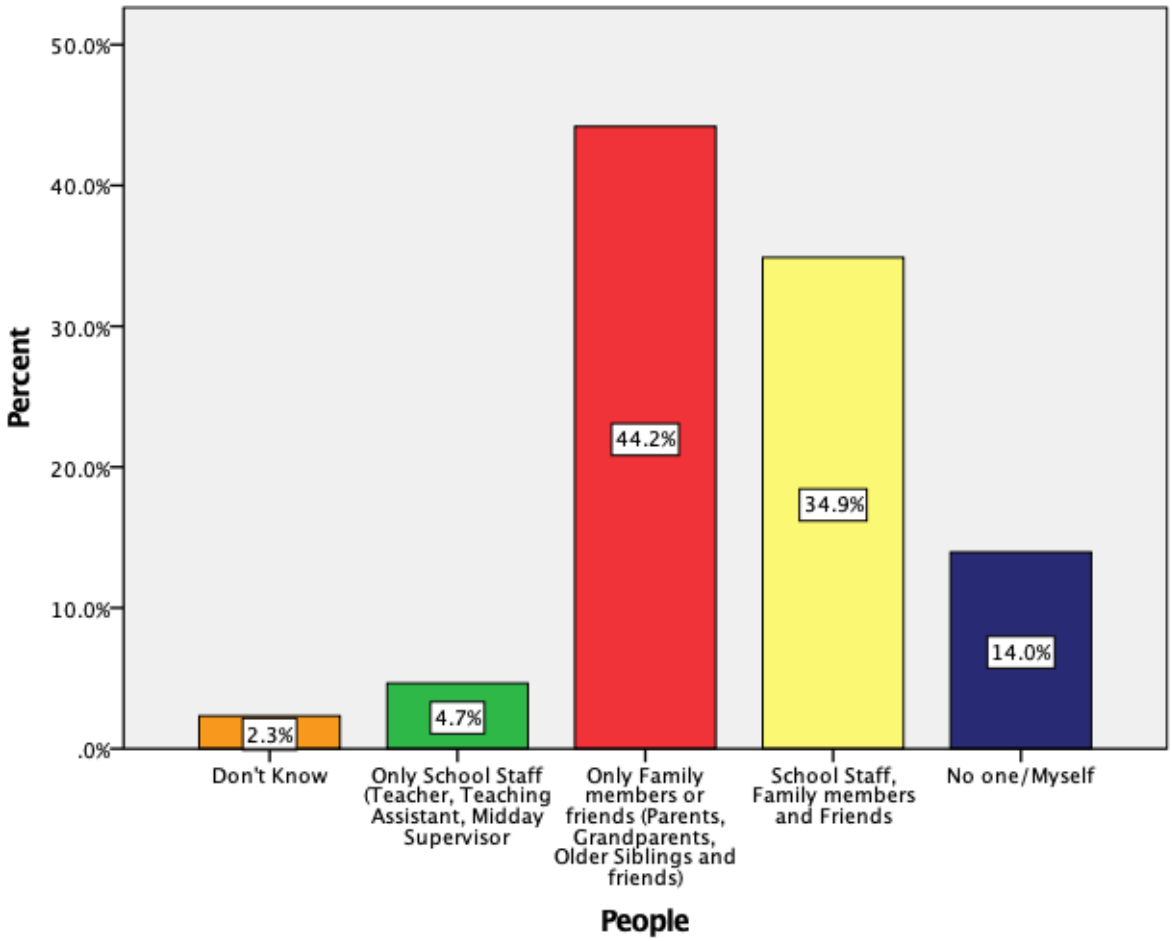



Figure 18 - Percentage values for who tells Reception children when to drink.

There were no *significant main effects or interactions* found ($p>0.05$) for who is the main influencer who tells the children when to drink. This figure further supports that there is a stronger parental influence in the Reception children's consumption of water. It was found that 44.2% of all the children mentioned only family members as significant people that inform them when to drink. This is in contrast to 4.7% only naming school staff. It was additionally discovered that 34.9% named both family members and school personnel as drinking influencers. Therefore, 39.6% of all the Reception children felt that someone in their school setting told them when to consume water (see figure 18).

***If Reception children were given the autonomy to take a drink of water and then play with toys or play with toys without taking hydration, what would they choose?***

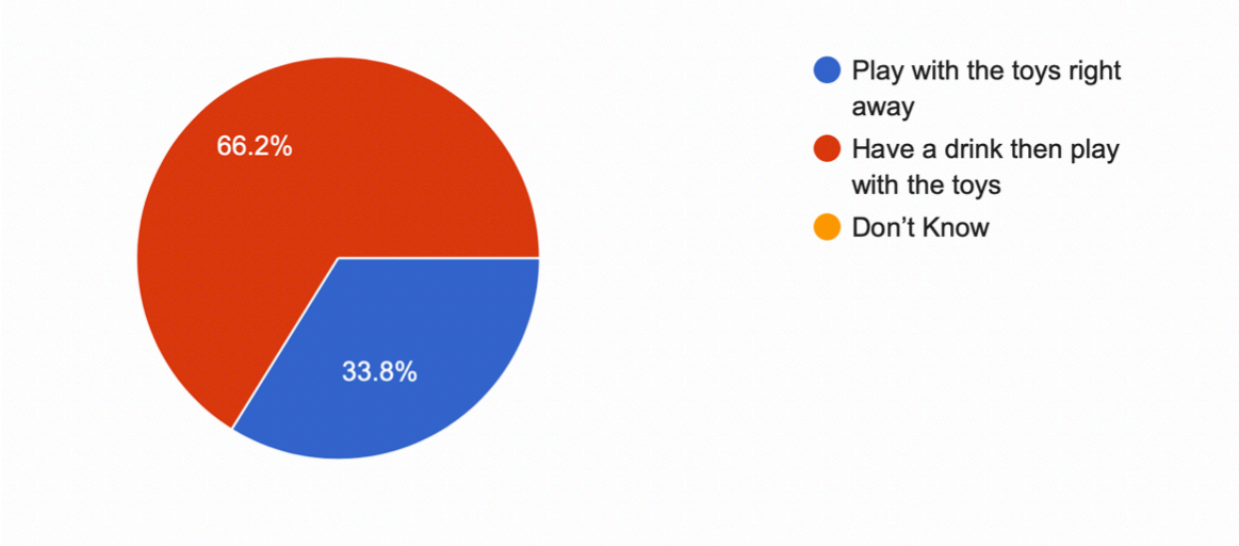



Figure 19 – Percentage values for if Reception children were thirsty and given the autonomy to drink water and then play with toys, or play with toys without taking hydration, what would they choose?

There were no *significant main effects or interactions* found ($p>0.05$). It was discovered that on average, if the 4 and 5 year old children were thirsty and given the choice of drinking and then playing with toys or playing with toys without drinking, 33.8% of them would choose to play rather than stopping and taking on fluids (see figure 19).

# ***Chapter 5 – Discussion***

## *5.1 Introduction*

The following areas within this chapter reference the results and literature review to form a coherent discussion investigating Reception children's knowledge and understanding of fluid intake.

For clarification, the focused areas for discussion will be as follows:

- Do Reception children know and understand if they are drinking enough water on a daily basis? (24 Hours)
- Is there a difference in knowledge and understanding according to gender?
- How much water Reception children drink throughout the school day? (9:00 – 15:10)
- Are Reception children already dehydrated before they arrive at school?
- Why do Reception children think drinking is important?
- Does a knowledge and understanding of classroom rituals and practices restrict Reception children's consumption of water after lunchtime and physical activity?
- What are Reception children's favourite drinks?
- Do teachers tell children when to drink?
- Implications for future teaching practice and policy summary.
- Implications for future research summary and limitations summary.

## *5.2 Do Reception children know and understand if they are drinking enough water on a daily basis? (24 Hours)*

It is the widely established view by the World Health Organisation (2004) that children aged 4-8, need 1.1-1.3 litres of fluid a day, not including the fluid obtained through food. As shown by figure 3 ($p>0.05$), this study found that 36.2% of all the participating

Reception children believed they drank 2 litres of water a day. It was found that a larger proportion of 46.9% thought they consumed a total of 500 ml or under a day. This finding suggests that nearly half of the Reception children in this study are drinking far below the World Health Organisation's International recommendations (2004) for a child's daily fluid intake and therefore the majority of children do not know the guidelines, thus, subsequently they are not drinking enough within the day. This could also suggest that children have yet to be taught about fluid intake that is needed during a day or they have poorly comprehended what has been taught to them. It is possible that the children may have guessed, rather than drawing on prior knowledge and understanding. Gass and Neu (2009) refer to this estimation as hedging or hazarding a guess, meaning that when people are asked a closed question that they do not know the answer to, they might risk guessing a calculated response, as they may not want to admit they do not know the correct answer.

As the children were asked multiple choice closed questions about their daily drinking perceptions, this provided the option of pointing to a measured-out quantity in a water bottle. This method gave them the opportunity to respond in accordance with this hedging concept, especially if they did not know how much water they consume daily. Hence, this could be one rationale for the wide division in responses. This factor is also acknowledged by Coppinger and Howells (2019), who found that children under the age of nine typically under evaluate their fluid consumption totals because of their potential lack of understanding. Due to the wide disparities identified in perceptions of fluid intake by Reception children, thereby development for future research should implement the observation of children's actual consumption levels over a set period of time. This could ascertain a more accurate picture of Reception children's daily fluid intake in

correspondence with the World Health Organisation's (2004) guidelines and the literature reviewed in this thesis.

With this notion of hedging in regard to fluid consumption, it is also crucial to consider measurement bias and reporter bias as Smith and Noble (2014) posit the view that unsuitable measurement tools may hinder the procurement of research data. Moreover, they suggest that reporter bias can also skew results if participants use the context of the research questions to illicit particular responses to please the researcher. As such, within the EYFS (DfE, 2014), there is a requirement to deliver knowledge surrounding metric measurements; however, due to the timing of the research occurring just after the Christmas break, the children may not have been taught measurements at that point in the academic calendar. Consequently, to reduce measurement bias, and to compensate for the fact that some of the children may not comprehend metric units, a visual stimulus was provided in the form of water bottles, therefore limiting potential measurement bias in this study (Corso, Hammitt and Graham, 2001).

However, issues with reporter bias remain unaccounted for, with or without visual bottles, as the children were already aware that the research was investigating their water consumption habits and understanding of the topic. Subsequently, if the children did not know an answer, rather than respond incorrectly, they may have pitched their responses towards the larger quantities in an attempt to provide the researcher with an answer they felt appropriate to appease the researcher. This could be one rationale for the 36.2% of children stating they consume 2 litres a day.

Moreover, another justification for why 46.9% of all Reception children perceived themselves to be drinking 500 ml of fluid or under a day could stem from the children's possible limited comprehension of the research questions themselves, and not just measurement bias. Irwin and Johnson (2005) identified that one possible issue in working with children so young, is that they simply do not comprehend some lines of enquiry without support. Hence, making it plausible that working with Reception age children could be one unavoidable limitation to this study. Therefore, to combat children's potential lack of understanding from questions that could illicit multiple answers, the binary query shown by figure 18 ($p>0.05$) was utilised to establish the children's active drinking agency, and whether they would drink or play when thirsty. The study found that when the children are thirsty, 33.8% of all Reception respondents would rather ignore their thirst response and continue their play without hydration. This statistic would concur with Benelam (2010), who supports that children do not have an effective thirst response to be able to independently recognise when they are thirsty, and how to achieve effective hydration. Consequently, this may be another factor which could explain why nearly 50% of the participants reported they drink 500 ml or under a day due to 33.8% not independently consuming fluids if they were given the choice to rehydrate. This finding also indicates the importance of introducing water bottles within the play situations, to encourage breaks within play rather than needed breaks outside of play, so the children can remain immersed in their play situation.

Nevertheless, if the lack of the children's understanding or an inaccurate thirst response is contributing to their perceived fluid consumption, to maintain hydration levels it must be strongly suggested, that children of this age should not be left to their own volition to consume fluids. As evidenced by the 46.9% of children who reported they

consumed 500 ml or under a day, and 33.8% who would rather play when thirsty; it is the case that four and five-year old children need consistent periodical reminders by their teachers and caregivers when to consume fluids, to ensure they maintain their daily hydration demands.

### *5.3 Is there a difference in knowledge and understanding according to gender?*

As indicated in figure 5 ($p<0.05$), the girls in schools One (50%), Three (75.9%) and Four (60%), comprised a significantly higher percentage whom believed they drank 500 ml or under a day, when compared to the boys in school One (27.3%), Three (40%) and Four (33.4%). This finding could lead to the suggestion that Reception age girls are in more danger of dehydration in contrast to their male counterparts. Furthermore, this is supported by Garriguet (2008), where he studied the fluid consumption quantities of children in Canada, including 4 to 8 year olds; it was found, that on average, boys drank 150 ml more a day than their female counterparts at this age. This is perhaps one rationale for the typically lower percentage of girls who thought they were drinking less than boys; however, it does not explain why. Therefore, further work is needed to explore the impact of the whole family's approach to drinking fluids to examine the possible reasons for the gender differences.

### *5.4 How much water Reception children drink throughout the school day? (9:00 – 15:10)*

Although 46.9% of all the Reception children reported they consumed 500 ml or under a day, it was found within figure 3 ($p>0.05$) that 33.1% of the children specifically reported they consumed 500 ml a day in total. Within the finding shown in figure 6 ($p>0.05$), when the research asked how much the children drank while at school, 49.2% of all the Reception children thought they only drank 250 ml a day in their educational

settings. Consequently, this research can suggest, that the 33.1% of all Reception children who drink a total of 500 ml a day in figure 3 ($p>0.05$), only consume 250 ml of that entire total whilst at school. As a result, it can be conveyed that these children may have a strong dependency on being allowed to drink water while at school, as they believed they drink half their daily totals while in their educational settings. This school time drinking dependency could also be reasoned by other areas of the research itself. As shown in figure 12 ($p>0.05$), when the children were asked how often they become thirsty after lunchtime, it was discovered that out of all the Reception respondents, 60% felt they 'always' became thirsty after lunchtime. Moreover, an additional 33.8% stated they 'sometimes' became thirsty after the same period in the school day. As such, and in line with the literature review, it seems the majority of children are reporting the early signs of dehydration, due to a loss of 1% of body weight occurring in the afternoons (Benelam and Wyness, 2010). Subsequently, it is reasonable to suggest that this finding could be in agreement with Kenney and Chiu (2001) and Benelam (2010); whereby, it was posited that children have underdeveloped thirst responses, which causes a 45-minute delay from the onset of dehydration to physically feeling thirst. This is supported by the result in figure 12 ($p>0.05$), that 93.8% of all the Reception children 'sometimes' or 'always' felt thirst once they return from lunchtime play, not during the activities themselves. Therefore, after the researcher spent time within the four research settings, it was noted that lunchtime break would last for at least an hour, whereby the children would start exercising 15 minutes following their midday meal. Consequently, this could explain the high proportion of reports indicating thirst after lunchtime break as they would be exercising for 45 minutes. Therefore, due to the children's lack of an effective thirst response, this requires recommendations to encourage developments in future research and practice. As the findings by Adan (2012) suggest that drinking water takes 2 minutes to realise cognitive

benefits, and that nearly all the Reception children felt thirst after lunch, the advice by the BNF (2016) should be adhered to and operated universally within these schools that are situated in the South East of England. The BNF suggest that teaching professionals should allow access to fluids during break and lesson time; therefore, it is paramount that teachers give their pupils ample time and opportunities to consume water within the school day. As evidenced by this study, nearly all the children felt thirst after lunchtime break. Moreover, a third of all four and five year old children have a strong dependency on being permitted to drink while they are in their learning settings, as they consume half their daily water intake while at school. By teachers allowing additional time to consume water during these periods, especially after physical exercise at lunchtime, it would allow children to drink more than half their daily consumption totals at schools and assist with their hydration status.

### *5.5 Are Reception children already dehydrated before they arrive at school?*

As illustrated by Figure 9 ($p>0.05$), the Reception children were asked when they consumed their first drink every day. It was found that 47.7% of all Reception children stated they consumed their first drink every day before school; when they wake up (10.8%) or with their breakfast (36.9%), with the remaining children either not knowing when they have their first beverage (19.2%) or stipulating a time while they are at school (33.1%). This is clearly an issue because it was further suggested by all the Reception children shown in figure 8 ($p>0.05$), that 40% are most thirsty in the earliest portions of the school day (before school: 27.7%, or when they arrive at school: 12.3%). Due to these results, this could indicate the Reception are representing a finding that is not completely dissimilar to that of Bar-David et al., (2005) and Bonnet et al., (2012), that over 60% of children arrive at school already in a hydration deficit, as over a third of children in this study named the

time they have their first drink while at school. It could be construed that if teachers were to encourage children to drink upon arrival at school, then this would help overcome the large proportion of children who are still arriving at school with a hydration deficit.

The fundamental issue with nearly half of all Reception age children claiming they are not obtaining liquid refreshment before they arrive at school, is the follow up effect that would proceed once they are at school. From this researcher's wealth of school teaching experience, children arriving at school without hydration, would either be using crucial learning time to enable them to meet their basic physiological needs or attempt to access early morning learning activities dehydrated. Consequently, in the view of Edmonds and Burford (2009), these children would benefit 10% less effectively from these tasks when compared to their hydrated peers. Bonnet et al, (2012) would subscribe to this idea that these children in particular would be seeking a source of fluid when they arrive at school to meet their physiological needs, even though in the view of Adan (2012), it only takes 2 minutes for the cognitive benefits to appear. Without fluid intake built into school arrival rituals, it can be argued that children may not be fully engaged in early morning learning opportunities, due to their hydration deficiency or pursuit of required fluids. This responsibility is due to the requirement of teaching practitioners to provide stimulating learning opportunities (DfE, 2014) and consequently, early morning learning opportunities would fall into this remit. This consequently allows for the summary that interventions and strategies need to be implemented to encourage children to drink at home before school, to maximise learning opportunities. This suggestion will however be discussed later in this chapter.

As exhibited within figure 9 ($p>0.05$), it was stated by 19.2% of all children that they did not know when they consumed their first drink every day. However, due to the age of the participants, this could be an issue of children not knowing particular times in the day, or that the children genuinely did not know or remember when they consumed their first drink. Consequently, this could raise wellbeing concerns about the time these children do and do not have their first drink because one day it could be at breakfast, but the next day it could be at school while learning. It is suggested by Miserandino (1996) that one factor to achieving academic success, is when there is structure, routine and continuity in children's lives. As a result, without structure to children's daily lives in terms of hydration, the 19.2% of Reception children whom are unaware of their initial drink, could have serious implications to their personal progress and attainment while at school. Fundamentally, Maslow (1958) posits a crucial supplement to this, by suggesting that without children's physiological and security needs being met, there may be less chance of them thriving within their education. Additionally, as likes and dislikes are formed in the primary classroom (Howells, 2012), it could also be suggested that the same aligns itself with 'structures, routines and continuity' (Miserandino, 1996). Subsequently, this research is recommending that more effective guidance on hydration should be a teaching priority for practitioners to consider and implement in all school settings, so that children know and understand how to develop healthy habits which will be explored later in the conclusion chapter.

Due to the potential lack of hydration before school indicated in figure 8 ($p>0.05$), where 40% of children felt most thirsty at the earliest times in the school day, with an additional deficiency in knowledge of routines, this should be considered when providing suggestions for future policy and practice. To encourage a holistic understanding of the

significance of adequate fluid consumption before the school day and at school, there should be an introduction of a 'hydration community pack' of resources to educate parents, teachers and children to improve the importance of adequate fluid intake, specifically the detrimental effects and symptoms of dehydration. Cloutier et al., (2018) subscribe to the idea that knowledge of healthy behaviours produces action into healthy habits; therefore, the promotion of a hydration community resource pack to be implemented at school and home may help to achieve this aim. Similarly, educational resource packs have worked successfully in the UK to combat obesity as demonstrated by the 'Change4Life' initiative, originally introduced in 2009, where they have produced a series of practical resources and software applications over the last decade to encourage a more consistent selection of healthier diet choices (Public Health England, 2019). Under this scheme, it was found that 85% of mothers agreed that the Change4Life scheme made them think more seriously about their children's health (The Marketing Society, 2012). If this intervention has altered the perceptions of healthy lifestyles for the vast majority of maternal care givers, then it may also be beneficial to implement more effective home guidance and instruction pertaining to the benefits of adequate water consumption. Additionally, this approach would be supported by Ellis and Tod (2018), whereby they subscribe to the idea that to enable more effective holistic educational development of children, a three-pronged approach of learning collaboration from the school, home and child should be encouraged to enrich learning experiences and educational development. As a result, the use of a 'hydration community pack' within schools and homes would be an effective start to accomplishing an enhanced understanding of fluid intake, as it would form the foundation to providing the essential hydration awareness required.

### *5.6 Why do Reception children think drinking is important?*

As demonstrated by figure 10 ($p<0.05$), the four and five-year old children were asked why they thought drinking was important. It was found that 58.3% of the five-year old children held the belief that drinking was important because it was beneficial to their health. While a lesser percentage of 53.6% of the four-year olds believed the same. This meant that a large majority of the four-year olds expressed a variety of reasons in connection with their beliefs about the importance of fluids or simply did not know. This lack of knowledge and understanding may mean that the children might not fully appreciate the benefits of fluid intake or why they need to drink to rehydrate for the body to utilise fluids. It was additionally found that 21.4%, of the younger age group did not know the importance of drinking fluids, while 4.8% of the four-year olds thought that a lack of consumption would lead to their death. Following the work by Johnston-Malloy et al., (2008) it was found that teachers in Ireland are not keen on children having perpetual access to water in lesson time, due to the persistent distractions within the classroom and increased urination that proceeds. This identifies a psychological concern for children and possible justification for the aforementioned results, because 21.4% did not know the importance, and 4.8% of the younger cohort thought they would die if they do not drink enough water. The latter childhood belief may cause the onset of a mental health condition developing, particularly as the National Health Service (2015) claim that 50% of all lifetime mental illnesses begin by the age of 14. Subsequently, this could be one contributing force for the rise in mental health referrals from children so young, particularly as nearly 5% think they are going to die if they do not drink enough water. This premise would concur with the Children's Commissioner (2016) who established that the earliest referrals to mental health professionals concerned children between 0 and 5 years of age, as such, this claim is entirely plausible. Furthermore, Maslow's (1958) conception is that individuals need to

have basic needs satisfied in order for them to develop effectively. It can be deduced by this study, that for the 4.8% of four-year old children who believe that a lack of drinking will discontinue their existence on this planet, that if a teaching practitioner where to then restrict the consumption of water within lesson time and prevent them when they were thirsty, it could be construed that this could impede the effectiveness of their teaching and learning of planned or independent activities. Thus, if a teacher withholds fluids due to the children causing classroom disruptions, this could be identified as a barrier to children's learning, as the children may be too preoccupied with the primal psychological belief that not enough fluids would cause death. Subsequently, any learning could be secondary, and as such, further education needs to be enlisted to children to expel this radical belief to assist with potential mental issues arising.

Fundamentally, if a fifth of four year olds did not know the importance of drinking water, with an additional 4.8% of children believing a lack of water would be fatal, it could be considered that this quarter of four year old children are forming a bad habit in relation to fluid intake. Additionally, due to the result that figure 13 ($p<0.05$) indicates that at least 54% of all the children demonstrated a very focused thirst instigator of running. This supports the notions from Bar-David et al., (2005) and Cloutier et al., (2018), that it is paramount that specific education on this topic needs to be delivered more effectively by teaching practitioners, to encourage adequate fluid intake. Consequently, for the suggestions of this study's implications for future research and practice, children need to understand the broad importance of adequate fluid intake and the consequences of dehydration. Cloutier et al., (2018) endorses that the knowledge of positive health behaviours informs practice into positive health habits, then it can surely be deduced that the same is relevant for the inverse. Howells' (2012) states that primary schools are

institutions that help form young people's likes and dislikes, and as a result they should be more instrumental in improving children's mental and physical health by delivering a greater awareness of hydration needs because of this. Bar-David et al., (2005) implies that teaching the knowledge of effective hydration can be transferred into adulthood as part of life-long learning. Consequently, to enable effective education of the essential requirements of fluid intake for children, this discussion will reinforce an earlier point by agreeing with Coppinger and Howells (2019) that a change in policy on a local and national level needs occur as it is long overdue. As some teachers have a poor understanding of the repercussions of poor hydration; therefore, the findings of Johnston-Malloy et al., (2008) and Gibson-Moore (2013) substantiate the vital necessity for further training around the subject of adequate fluid intake. Subsequently, to realise this, it should be statutory for schools to implement the importance of adequate water consumption within their continual professional development strategies (CPD). This approach would highlight the significance to practitioner's pupils' adequate fluid intake, to enable a more effective transfer of knowledge, rather than assume that young children are naturally aware of their biological needs. As a result, future research would need to be developed as to the efficiency of this suggestion and whether the health and cognitive benefits justify the cost of additional training.

### *5.7 Does a knowledge and understanding of classroom rituals and practices restrict Reception children's consumption of water after lunchtime and physical activity?*

This research brought forward the notion as to whether the Reception children within this study recognise they are allowed to rehydrate after lunchtime break, and physical activity, to examine potential barriers to water consumption. As previously shown in figure 12 ($p>0.05$), 93.8% can exhibit the 'thirst' sign of dehydration following an

extended period of lunchtime physical activity. Additionally, as shown by figure 14 ($p>0.05$) the children were asked for the times in the school day when they felt they were allowed to drink, only 24.9% of the whole sample stated they felt they could drink: at lunchtime (10.9%), after lunch (9.3%) or in the afternoon (4.7%). With an additional 33.3% of the children who felt they could drink at any point in the school day, this result highlights that 58.2% of the children are aware they are allowed to drink in the afternoon. Therefore, it can be deduced that because 41.8% of four and five year olds felt they were allowed to drink at other times in the day (4.6%); in the morning (12.4%); at home time (6.2%) or simply did not know when they were allowed to drink at school (18.6%). Therefore, the children did not drink or did not ask for a drink, even though they may have been thirsty. This subsequently could indicate a lack of knowledge of the permitted drinking hours amongst Reception children whilst at school, which in the view of Coppinger and Howells (2019) could reduce the amount they drink throughout the whole 24 hour day. This claim is further supported by figure 15 ($p>0.05$) where it was found that 33.8% of the children did not know when they were not allowed to drink at school. This lacking awareness of prohibited drinking times could be down to two factors, there are no prohibited times of consumption at school or not knowing a time could be conveyed as "never a time". However, 43.8% of the children replied by stating there was "never a time" they could not drink, indicating that the answer of "don't know" represents the other factor of a genuine unawareness of prohibited drinking times. This issue draws back to the work of Miserandino (1996) and that an understanding of structures in the school day can lead to increased progress and attainment within their learning. Therefore, an improved awareness of permitted and prohibited drinking times could, in theory, increase the amount of water children drink. Furthermore, as previously touched upon, Coppinger and Howells (2019) state that a restriction of drinking within school hours would consequently decrease the

overall time children have to consume fluids within their waking hours. Moreover, as suggested by them, that due to the fact that children spend a large percentage of their waking hours within educational settings, this would have a negative effect on the amount of water children drink in total. This leads to the clear correlation that because within the research settings, afternoon activities constituted half the time children are present at school, this lacking awareness of permitted drinking periods after lunchtime, and generally prohibited drinking times. Inherently, this could be one factor as to why 46.9% of Reception children are drinking 500 ml or under in a 24 hour day.

Evidently, from the synopsis of the data and the supporting literature, to help form suggestions for future policy and practice, schools clearly need to play a more substantive and proactive role in ensuring all children understand and meet their hydration requirements. These results support that Reception children have ineffective thirst responses, lack an awareness of permitted and prohibited drinking times, and a third of children have a school drinking dependency as they consume 250 ml of their reported accumulative daily total of 500 ml in school hours. It must be recommended, that in agreement with Coppinger and Howells (2019), for the active progression of teaching and learning standards, Bar-Or et al., (1980) considered it to be beneficial for teachers to be educated of the benefits of adequate fluid intake, by allowing children a short period of whole cohort rest and rehydration after lunchtime break, in the form of a ‘drinks break’. This will enable all children to rehydrate after bouts of physical activity, while also permitting all children to become accustomed to the fact that physical activity should induce thirst (Stand, 2009). Additionally, as Adan (2012) suggests the cognitive benefits of additional water consumption takes 2 minutes to have an effect, this would make the ‘drinks break’ even more effective. It must be noted that although the idea of an on-mass

rehydration break dates back to 1980, the pedagogic practice of when to realise this suggestion is still up for debate. In the view of this trained primary school teacher, the process could be carried out while the teacher is conducting the afternoon register to cause least disruption to learning, to permit all children to be ready for teaching input; while also allowing the children to recoup any fluid loss after exercise. This practice could be one approach to meet the suggestion by Coppinger and Howells (2019), when they posited that schools should alter drinking polices to assist children to attain an adequate hydration status, to ensure all children are cognitively and physiologically ready for learning. Furthermore, this procedure could also be applied to the morning register to assist the aforementioned two thirds of children not meeting their hydration needs at that time in the day. However, clearly, the efficacy of this recommendation would need to be further researched, to ascertain the issues and benefits to enable a widespread adoption of encouraging drinks breaks during registration, to enable effective hydration of Reception children after spells of physical exercise, such as lunchtimes.

### *5.8 What are Reception Children's favourite drinks?*

With a fifth of four year olds not knowing the importance of water intake (Figure 10, ($p<0.05$)), and 46.9% of all Reception children reporting they are consuming 500 ml or under a day (figure 3, ($p>0.05$)), it could be plausible that other fluids might be their preferred choice to give a rationale for this. As shown by figure 16 ($p>0.05$), 55.4% of the Reception children informed the study that water or a flavoured cordial/squash was their favourite drink. Moreover, 30.8% of the 4 and 5 year old children specifically claimed that plain water or its carbonated variant is their favourite. However, 20.8% of the 4 and 5 year old children did state that a high sugar fruit concentrated beverage, such as apple or orange juice, is their preferred option. In the study by Petter, Hourihane and Rolles (1995), it was

acknowledged that 50% of children slightly younger than Reception age children never drank ordinary water during the 48-hour time span of their study. While additionally, Patel and Hampton (2011) suggest that when given an option, children tend to choose sugary drinks due to their more appealing taste. This is in contrast to the level of sugary drinks consumed by children in the years since, as supported by Public Health England (2019) whom indicated in their latest report that the consumption of sugar sweetened beverages has now decreased in recent years, stating that 22% of children aged 4-10 years of age receive their processed sugar allocation through these means.

However, in regard to this study's finding that over half of the Reception respondents claimed that water or cordial/squash is their favourite drink, this somewhat agrees with the recent work of Coppinger and Howells (2019). Their research found that 64% of all children showed a stronger preference towards water and cordial/squash. Consequently, this study, in addition to the work by Coppinger and Howells (2019), could be considered as an update from the older work by Petter, Hourihane and Rolles (1995), and Patel and Hampton (2011), by concluding that children are no longer being conditioned to drink sugar based drinks, and consequently should not be as strong of a barrier to consuming water than in the past. Furthermore, this could be verification of the strategies implemented by the 'Change4Life' initiative (Public Health England, 2019). Due to their resources and software applications, there has been a seismic shift in the wider public knowledge of the quantities of refined sugar in these types of beverages, and thus is another supporting factor of the efficacy that 'hydration community packs' have a positive effect on the health and wellbeing of children. Consequently, this author's study must acknowledge there has been a decline in sugary drink consumption within the last twenty years, as there is little evidence to suggest that a higher proportion of these children prefer

sugary alternatives, compared to water. This subsequently cannot provide a rationale for the large proportion of Reception children whom are under consuming fluids daily.

The socioeconomic area of the schools that participated in the research, were generally considered to be disadvantaged (Kent Public Health Observatory, 2016). When each school's Pupil Premium percentage is applied, the average of the four schools is 19.75%. This includes school three, which contained over a third of children with Pupil Premium funding, due to the aforementioned criteria within the methodology. With 20.8% of the entire research sample claiming that a fruit concentrated juice is their preferred option of beverage, it can be claimed that this category of drink may be an affordable option for parents or guardians to provide than water. The cost of a 1 litre carton of apple juice in a leading UK supermarket, is 55 pence (ASDA, 2019), therefore due to this subjectively low product cost in comparison to other sugar sweetened drinks, this could be a justification for the parental purchase, and one rationale as to why a fifth of the Reception children responded in this manner.

In the study, 14.6% of the children stated that they enjoyed milk the most. In the UK, children under 5 years of age are entitled to free daily milk at school (Rural Payments Agency, 2017). Once a child reaches 5, they either stop receiving daily milk at school, or their parents pay for it. Among the 14.6% of all children, there was an even split of 4 and 5 year old children whom liked milk the most. Consequently, this infers no correlation that 4 year olds favoured this choice, due to the fact there is no additional expense for care givers. It could be considered that due to this, children of both ages have added exposure to this fluid while at school whether they have it at school for free or not. Additionally, the fact that milk must be kept refrigerated due to health and hygiene issues, could be another

rationale as to why 14.6% liked this beverage the most, due to the cold nature of the milk. This subject was discussed by Van Belzen, Postma and Boesveldt (2017) in their research pertaining to the thirst-quenching nature of a variety of different drinks. They found that cold beverages were far more favourable and satisfying to consume than warm drinks. This research is rather pertinent considering the experience of this researcher's teaching expertise and the time spent in the research settings. In all the schools, water bottles were stored on a trolley in a warm classroom, and thus due to this, could reduce the susceptibility of children drinking from them, and in turn may reduce the quantity they drink in school time. This posit relating to the temperature of the water and the prospect of children drinking warm water, could be supported by observations that in two of the school's staffrooms there were water coolers for the benefit of school staff. Loughridge and Barratt (2005) studied the efficacy of whether using water coolers would increase fluid uptake, and reduce sugary drink consumption over a 3-month period in three secondary schools in North Tyneside. They found that the combination of placing a cooled water system in the canteen, as well as actively promoting the benefits of drinking water, increased the likelihood of the children choosing to drink water. With this in mind, and the fact that 14.6% of all the Reception children liked milk the most. It could, as such, be suggested that cooled water stations or water bottles, with the facility to stay cool for the duration of the school day, are introduced as a useful addition in the classroom setting. This consequently could contribute to rise in the amount of water children drink while at school to help them achieve the recommended daily guidelines (WHO, 2004).

Nevertheless, the limitations of this question must be contemplated, as the query only asked what the children's favourite beverage is, and not how often they consume the reported drink. As a result, due to the open-ended style of the question, two deductions

could be implied: that as there was no external stimulus to prompt particular replies, their answers could therefore be considered as a drink that they consume on a regular basis, or is a beverage they have as an infrequent treat, but enjoy more than other options, for example, water. Thus, for future research within this area, an additional question must be asked as to the frequency of how often children have their favourite drink. This would then allow new studies to determine whether these favourite beverages are having an impact on daily water intake.

Fundamentally, the majority of Reception children liked water or a fruit-based cordial/squash the most which does illicit the query as to why this might be. When considering the order in which the questions were asked, the position of this query was last in both this study and the work of Coppinger and Howells (2019). This therefore, could bring forward the notion that due to the fact that the child participants in both studies knew they were discussing water, and the various topics surrounding the consumption of it, this may have augmented their replies to please the researcher. Consequently, the issue of the Hawthorne effect (Landsburger, 1958) became apparent and hence, for future research and iterations of this study, it is suggested that the position of the 'favourite drink' question should be placed first, before any other queries are asked, with the additional question pertaining to the frequency the children consume their favourite beverage. This could in turn reduce the risk of the Hawthorne effect becoming evident, while also allowing for the full functionality of the subsequent questions to arise.

### *5.9 Do teachers tell children when to drink?*

As indicated by figure 14 ($p>0.05$) and 15 ($p>0.05$), it appears that educational settings encourage consumption less than the home setting. As previously mentioned, Coppinger

and Howells (2019) state that children spend a large proportion of their waking hours at school, and as such, this section will explore the extent as to the disparity of school and home drinking influences and suggest methods in which to improve it.

As Saltmarsh (2001) eluded to, that drinking is a learnt response, it is consequently important to determine whether the teaching practitioners in the four settings are informing the children when to drink, to confront the aforementioned issues. As shown by figure 17, from the whole sample of 130 children, only 50 of the Reception age children felt their teacher told them when to drink, with an additional 12 also naming a teaching assistant. Therefore, suggesting that over half of all the Reception children did not feel their main school educational influencers told them when to drink water while at school. Additionally, this finding is almost parallel to Coppinger and Howells' (2019) finding; whereby, within their international comparison of primary age children's understanding of fluid intake, 55% of the younger children in their study felt a family member or themselves were most likely to remind them to drink. This supports the earlier future suggestion, that due to this stronger home influence; a hydration community pack of resources needs to be developed to increase awareness of knowledge of the benefits of effective hydration. This will potentially encourage a greater level of parents and teachers to remind their children to drink, which could help all children increase their fluid consumption. Moreover, this may assist the parents of the 33.1% of children in figure 9 ($p>0.05$), who claimed they consume their first beverage at school, to expand their lack in fluid intake knowledge and understanding, to ensure their children drink before arriving at school.

In figure 18 ($p>0.05$), the role teachers play in hydration updates is further explored when the groups of influencers were analysed together. It was found that 4.7% only named

school staff, as opposed to 44.2% only naming family and friends; thus, indicating a vast differential in external influences. One rationale for this could be due to the researcher's reflective notes while at school one, during an informal conversation with the class teacher. Although it must be recognised that this is not the main method of data collection within the study, it is important that such vital information is added to this discussion to give context of this particular school, and the 38 children that contributed to the study. The school one practitioner suggested that she was reluctant to inform the children when to drink in school time because it was felt that her pupils would benefit from the independence of their own water consumption, citing "the children will drink when they are thirsty". However, in agreement with Benelam (2010) and Shaw (2010), children do not have an effective thirst response to drink when they are thirsty, and therefore need prompting or effective education to alter their drinking habits (Cloutier et al., 2018). It is stated within the framework for the EYFS (DfE, 2014, p.10) that "children know the importance for good health of physical exercise and a healthy diet, and talk about ways to keep healthy and safe". The researcher is not suggesting that this tributary evidence is compromising the competency of this early years teacher, it is simply suggesting by gifting children of this age the complete autonomy over their own consumption of fluids in the school setting could be another cause of the high levels of reported under consumption, and as such it must be suggested that a change in policy and practice needs to occur. This somewhat bold statement could be supported by the previously stated data in figure 19 ($p>0.05$), that 33.8% of all children would rather play than drink when thirsty, then clearly, this offering of independence when the children are not effectively educated in this area is an issue that needs to be addressed. As a result, further research needs to be conducted into the pedagogical practices of teachers in regard to children's fluid consumption, to establish whether this claim by one practitioner is more widespread. Where additionally, this study

is concluding that teachers fundamentally need to prompt their pupils to drink throughout the school day to enable the children to obtain an adequate hydration status.

### *5.10 Implications for future teaching practice and policy*

This study has found that the children are not currently supported in developing their knowledge of when and how much to drink, as over half of the recorded responses in figure 17 did not state that their teacher or other educational influencers told them when to drink, and that nearly 50% of Reception children do not drink enough in total (see figure 3, ($p>0.05$)). With all the research evidence applied, to summarise the suggestions for future teaching practice, it is clearly paramount that a whole cohort "drinks break" needs to be implemented to enable all children to recuperate fluid loss after physical exercise breaks. This could enable the children to subtlety learn that after a period of exercise, one should seek liquid hydration to maintain hydration levels. However, crucially, in the opinion of this qualified teacher researcher, this process could be carried out while the teacher is conducting the afternoon or morning register to cause least disruption to learning. During this time, the children are only required to answer to their name, whereby it could be considered beneficial, as the children would clearly be drinking and not talking over the teacher.

Fundamentally, to increase water consumption while at school, there needs to be a break in the cycle of teachers not liking their pupils to drink in lesson time due to pedagogical disruptions (Johnston-Malloy et al., 2008). Furthermore, the children themselves are physiologically not able to effectively recognise their own thirst responses, or acknowledge the signs of thirst early enough to prevent dehydration. An additional area critiqued in the literature review, is the approach to teaching and learning supported by

Ephgrave and Bilton (2012), that the implementation of life experiences within the play element of Reception children's learning enriches the schooling process. One recommendation to encourage an increase in drinking could be via the teachers encouraging children to take their water bottle with them to firstly remind themselves to drink while they are playing. Secondly, this may subtly introduce to the children that it is considered a healthy life practice to have a beverage nearby to enable a consistent uptake of fluids throughout the day, even if they are not necessarily thirsty to help maintain an effective hydration status. This approach acknowledges some of the firm pedagogical beliefs held by practitioners and provides an alternative that would be supported by the BNF (2016) by allowing access to fluids in lesson time. This may ensure there is not a break in learning to obtain hydration, while also assisting the children in meeting their physiological needs.

Additionally, for the long-term attainment of preventing childhood dehydration, more focused learning needs to be delivered to children and adults about the benefits and requirements of effective fluid consumption, to attempt to fight the physiological impasse of ineffective childhood thirst responses. By educating teachers, parents and carers about effective fluid uptake, this could enable teachers to actively engage in the proactive encouragement of assisting children to regularly drink fluids within school time and at home. This in turn could enable children to learn when the appropriate times are to drink water, and therefore could gift the children the agency to consume fluids more independently in the future. The education of parents and teachers could be implemented by the use of a hydration community resource pack, to allow all care givers the knowledge and means in order to educate themselves, to be able to transfer this knowledge onto the children in their care. Where additionally, schools should consider implementing further education and training as part of their continual professional development programmes as

this would not only increase awareness of all parties but also help schools in attaining a gold standard within the newly introduced healthy schools rating scheme by the Department for Education (2019). Consequently, this recommendation would need to be further researched and explored, as to determine the effectiveness of the intervention. This could then have a domino effect as the teachers would be more aware of the benefits and limitations of adequate hydration. This could encourage practitioners to allow children more comprehensive access to water in lesson and break-times, and as such, realise one key suggestion by the BNF (2016).

To summarise, this research is consequently suggesting that interventions for future and practice should include:

- The introduction of a hydration community pack of teaching and learning resources, to encourage a deeper level of knowledge and understanding of fluid consumption for teachers, parents and children. To assist all influencers in a child's life to attain an adequate hydration status.

- Supplementary teaching and learning from teachers to educate children about the impact of the signs of dehydration and how to recognise the thirst response, while also teaching the benefits of adequate hydration, to allow the children to form good life habits.

- Finally, teachers need to allow children more time and opportunities to drink water while at school, in instructing them to drink regularly. The most impactful

times to implement this would be after spells of physical activity, to allow the children to gradually realise that it is regarded good practice to rehydrate after exercise to meet hydration demands. While also encouraging children to have their bottles with them while in play activities to improve more consistent uptake.

### *5.10.1 Implications for future research summary and limitations*

Although this was a comprehensive and enlightening study to conduct, there were some limitations. The limitations to inform the improvement of future similar studies are:

- The favourite drink question needs to come first to negate the Hawthorne effect; whereby, the frequency of the consumption of these beverages needs to be questioned.

- The limitation of the actual age and comprehension of certain questions needs attention. This was counter acted by a series of closed questions and a binary two option question, as well as the researcher's own knowledge of teaching this age group. Although it was important to acknowledge these forecasted limitations, these foreseen interventions allowed all children to answer and partake in the research.

- Due to the necessary additional resources to aid with participant understanding, this is another limitation to the study for how the questionnaire could be reproduced for future work. Boynton and Greenhalgh (2004) imply that one of the simplest methods to rectify this would be to include a checklist of required

comprehension aids to ensure future researchers are equipped with all the required tools. Please see below for the aforementioned checklist.

1. Questionnaire
2. Visual water bottles
3. A toy
4. Visual Likert scale

With these limitations addressed, it is possible that this researcher could conduct these research suggestions providing funding is made available from drink sponsors or research councils. These suggestions for further research would include:

- Additional studies pertaining to the effectiveness of hydration community packs and extra adult education in relation to the sufficient consumption of fluids. The development of this pack would need to be created by knowledgeable professionals in the area. Whereby, essentially a similar study to this paper would have to be repeated to ascertain a baseline of current understanding of the new participants. Where additionally, the newly created hydration community pack would be used with the children, teachers and parents to boost their comprehension of the topic, to ultimately end with the repeat of questioning to ascertain the efficacy of the aforementioned proposal.

- Additionally, larger powered studies could be conducted but with the further integration of triangulated qualitative data to examine some of the questions posed from this study as to why a selection of results have occurred. For

instance, this could be a useful device to investigate why girls typically consumed less water than boys. Perhaps, because it appears further examination of this finding could venture more deeply into the realm of this variety of data analysis due to the many variables that would inevitably be involved.

- Observe actual school fluid consumption levels to obtain more accurate results in relation to the amount of fluid consumed daily, to reduce the issue of under or over reporting. This would involve a researcher being present in various educational settings observing children consume fluids, while tangibly recording the frequency and quantity of consumption from the young participants.

- Further research into the drinking habits of the "whole family" to establish the effects of home life on a child's adequate water uptake. Questioning of parents and siblings could yield an answer to this query.

- Additional work into the teacher's role and understanding of water intake via CPD avenues, and how this has an effect on their pupils' daily consumption. This could help schools meet the voluntary requirements set out within the healthy schools rating scheme (DfE, 2019). This could be conducted via an interventional study, splitting cohorts of teachers into two groups. Whereby, further teacher education could be administered to one group, no additional tuition to the other. To examine the efficiency of the proposal, this could work alongside the aforementioned 'larger powered' suggestion within the

preliminary stage of acquisitioning the understanding from this larger sample size, to possibly gain a more balanced understanding of not only the vastly substantial sample sizes' knowledge, but also ascertain whether a practitioner's enhanced knowledge via CPD would be beneficial in assisting the children to improving their understanding.

- Further work into the efficacy of water coolers within the classroom setting and the impact this has on the uptake on fluids within the school day. Utalising multi-form reception settings. To ascertain the efficacy of the proposal, placement of the aforementioned cooled water could be implemented in one class and no placement in another to act as the control. This could be worked alongside the aforementioned observation of water consumption proposal.

- Finally, further research into the efficacy of increased opportunities for children to carry water bottles while playing in the classroom. An interventional study could take place, featuring multi-form Reception settings similar to the cooled water proposal to evaluate the efficacy on fluid uptake and general understanding of the topic.

### *5.11 Conclusion*

In conclusion, overall, Reception class children on average do not know and understand the recommended daily fluid intake levels and the majority of the children within this thesis study were found to be not drinking enough daily fluids, thus disproving the hypothesis that there should be a consistent answer among the young children. On average, a majority of children reported they are not influenced to drink fluids by their teachers, disproving the hypothesise within the introduction section (1.4), where it was felt

that teachers would be supporting their pupils' hydration needs. Where additionally, with the limited data available, it suggested many children maybe arriving at school not having a drink since the day before. Finally, the Reception children also reported that they chose to ignore or potentially did not recognise their thirst response, as they were focused, and preferred to continue with their play-based activities, rather than stop to have a drink. Moreover, in the process, disproving the two hypothesise that all children should have a core understanding about their own fluid intake. Further knowledge and understanding needs to be developed with the help of a hydration community pack to assist in particular young children in developing lifelong drinking habits.

## ***Reference List***

Adan, A. (2012). 'Cognitive performance and dehydration'. *Journal of the American College of Nutrition*, 31(2).

Alderson, P. (2005). *'Designing ethical research with* children'. In: Farrell A (ed) *Exploring ethical research with children*. Buckingham: Open University Press.

ASDA groceries, (2019). *Price of Apple Juice*. Available at: https://groceries.asda.com/product/apple-juice/asda-smart-price-apple-juice/32823 (Accessed: 22nd March 2019).

Ashby, R. W. (1964). 'Logical positivism'. In O'Connor, D. J. (Ed), *A critical history of western philosophy*. New York: The Free Press.

Austin, R. (2016). *Researching Primary Education*. London: Learning Matters.

Bagnoli, A. (2004). 'Researching identities with multi-method autobiographies'. *Sociological Research Online*, *9*(2).

Ballauff, A., Kersting, M., & Manz, F. (1988). 'Do children have an adequate fluid intake? Water balance studies carried out at home'. *Annals of nutrition and metabolism*, 32(5-6).

Bar-David, Y. A. I. R., Urkin, J., & Kozminsky, E. L. Y. (2005). 'The effect of voluntary dehydration on cognitive functions of elementary school children'. *Acta Paediatrica*, *94*(11).

Bar-Or, O., Dotan, R., Inbar, O., Rotshtein, A., & Zonder, H. (1980). 'Voluntary hypohydration in 10-to 12-year-old boys'. *Journal of Applied Physiology*, 48(1).

Bell, E., Bryman, A., & Harley, B. (2018). *Business research methods*. Oxford: Oxford university press.

Benelam, B. (2010). 'Recognizing the signs of dehydration'. *Practice Nursing*, 21(5).

Benelam, B., & Wyness, L. (2010). 'Hydration and health: a review'. *Nutrition Bulletin*, 35(1).

Biddix, P. (2017). *Writing Research Questions*. Available at: https://researchrundownns.com/intro/writing-research-questions/ (Accessed: 22nd November 2018).

Bonnet, F., Lepicard, E. M., Cathrin, L., Letellier, C., Constant, F., Hawili, N., & Friedlander, G. (2012). 'French children start their school day with a hydration deficit'. *Annals of Nutrition and Metabolism*, 60(4).

Borg, W. R. and Gall, M. D. (1979) *Educational Research: An Introduction* (third edition). London: Longman.

Bowling, A. (2005). 'Mode of questionnaire administration can have serious effects on data quality'. *Journal of public health*, *27*(3).

Box, V., & Landman, J. (1994). 'Children who have no breakfast'. *Health Education*, 94(4).

Boynton, P. M., & Greenhalgh, T. (2004). Selecting, designing, and developing your questionnaire. *Bmj*, *328*(7451)

British Educational Research Association, (2011). *BERA Ethical Guidelines for Educational Research.* Available at: https://www.bera.ac.uk/wp-content/uploads/2014/02/BERA-Ethical-Guidelines-2011.pdf (Accessed: 10th December 2018).

British Nutrition Foundation, (2016). *Hydration for Children*. Available at: https://www.nutrition.org.uk/healthyliving/hydration/hydration-for-children (Accessed: 13th November 2018).

Burnett, P. J., & Burnett, J. (2012). *Liquid pleasures: a social history of drinks in modern Britain*. London: Routledge.

Children's Commissioner, (2016). *Lightning Review: Access to child and Adolescent Mental Health Services*. Available at: https://www.childrenscommissioner.gov.uk/wp-content/uploads/2017/06/Childrens-Commissioners-Mental-Health-Lightning-Review.pdf. (Accessed: 7th May 2019).

Christiansen, P., Toft, P. B., Gideon, P., Danielsen, E. R., Ring, P., & Henriksen, O. (1994). 'MR-visible water content in human brain: a proton MRS study'. *Magnetic resonance imaging*, 12(8).

Clark, A., & Moss, P. (2011). *Listening to young children: The mosaic approach*. London. National Children's Bureau.

Cloutier, M. M., Wiley, J. F., Trapp, C., Haile, J., & Gorin, A. A. (2018). 'The Childcare Center: an Untapped Opportunity to Engage and Educate Families in Healthy Behaviors'. *Journal of racial and ethnic health disparities*, 5(2).

Cobb, W. (2016) *'Research methods: how will I collect the data?'*. In: Austin, R. (ed.) *Researching Primary Education.* London: Learning Matters.

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education*. London: Routledge.

Colonnesi, C., Nikolić, M., de Vente, W., & Bögels, S. M. (2017). 'Social anxiety symptoms in young children: investigating the interplay of theory of mind and expressions of shyness'. *Journal of abnormal child psychology*, 45(5).

Coppinger, T. and Howells, K. (2019). 'International Comparison of Children's Knowledge, Barriers and Reported Fluid Intake Across the School Day'. *International Journal of Nutrition*, 4(1).

Corso, P. S., Hammitt, J. K., & Graham, J. D. (2001). 'Valuing mortality-risk reduction: using visual aids to improve the validity of contingent valuation'. *Journal of risk and Uncertainty*, *23*(2).

Cox, A. M., McKevitt, C., Rudd, A. G., & Wolfe, C. D. (2006). 'Socioeconomic status and stroke'. *The Lancet Neurology*, *5*(2).

Creswell, J. W., Hanson, W. E., Clark Plano, V. L., & Morales, A. (2007). 'Qualitative research designs: Selection and implementation'. *The counselling psychologist*, *35*(2).

Creswell, J. W. (2009). *Research design: Qualitative and mixed methods approaches.* London: SAGE.

Crotty, M. (1998). *The Foundations of Social Research: Meaning and Perspectives in the Research Process*. London: Sage Publications.

D'Anci, K. E., Constant, F., & Rosenberg, I. H. (2006). '*Hydration and cognitive function in children'*. Nutrition reviews, 64(10).

DeMyer, M. K., Alpern, G. D., Barton, S., DeMyer, W. E., Churchill, D. W., Hingtgen, J. N., & Kimberlin, C. (1972). 'Imitation in autistic, early schizophrenic, and non-psychotic subnormal children'. *Journal of autism and childhood schizophrenia*, *2*(3).

Department for Education, (2014). *Early Years Foundation Stage Framework*. Available at: https://www.gov.uk/government/publications/early-years-foundation-stage-framework--2 (Accessed: 16th October 2018).

Department for Education, (2019). *Healthy Schools Rating Scheme*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/814914/Healthy_schools_rating_scheme.pdf (Accessed: 30th July 2019).

Department for Education, (2018). *Pupil Premium 2018-2019: Conditions of the Grant.* Available at: https://www.gov.uk/government/publications/pupil-premium-conditions-of-grant-2018-to-2019/pupil-premium-2018-to-2019-conditions-of-grant. (Accessed: 4th March 2019).

Driscoll, D. L., Appiah-Yeboah, A., Salib, P., & Rupert, D. J. (2007). 'Merging qualitative and quantitative data in mixed methods research: How to and why not'. *Ecological and Environmental Anthropology*, 3(1).

Economic and Social Research Council, (2015). *ESRC Framework of Research Ethics.* Available at: https://esrc.ukri.org/files/funding/guidance-for-applicants/esrc-framework-for-research-ethics-2015/ (Accessed: 10th December 2018).

Edmonds, C. J., & Burford, D. (2009). 'Should children drink more water?: the effects of drinking water on cognition in children'. *Appetite*, 52(3).

Edmunds, L. D., Summerbell, C. D., Douthwaite, W., Whittaker, V., Ells, L. J., Hillier, F., & Macdonald, I. (2009). The association between diet and physical activity and

subsequent excess weight gain and obesity assessed at 5 years of age or older: a systematic review of the epidemiological evidence. *International Journal of Obesity*, *33*(S3).

EFSA Panel on Dietetic Products, Nutrition, and Allergies, (2010). 'Scientific opinion on dietary reference values for water'. *EFSA Journal*, 8(3).

Field, A. (2017). *Discovering statistics using IBM SPSS statistics*. London: Sage.

Ellis, S., & Tod, J. (2018). *Behaviour for Learning: Promoting Positive Relationships in the Classroom*. London: Routledge.

Ephgrave, A. B. & Bilton, H. (2012) *The Reception year in action: A month-by-month guide to success in the classroom.* New York: Taylor & Francis.

Frowe, I. (2001). 'Language and educational research'. *Journal of Philosophy and Education*, *35*(2).

Garriguet, D. (2008). 'Beverage consumption of children and teens'. *Health Rep*, *19*(4).

Gass, S., & Neu, J. (Eds.). (2009). *Speech acts across cultures: Challenges to communication in a second language* (Vol. 11). Berlin: Walter de Gruyter & Co.

Gathercole, S. E., & Alloway, T. P. (2006). 'Practitioner review: Short-term and working memory impairments in neurodevelopmental disorders: Diagnosis and remedial support'. *Journal of Child Psychology and Psychiatry*, 47(1).

Gibson-Moore, H. (2013). 'Improving hydration in children: A sensible guide'. *Nutrition Bulletin,* 38(2).

Gittelman, M. A., Mahabee-Gittens, E. M., & Gonzalez-del-Rey, J. (2004). 'Common medical terms defined by parents: are we speaking the same language?'. *Pediatric emergency care*, *20*(11).

Glimcher, L. H., & Lee, A. H. (2009). 'From sugar to fat'. *Annals of the New York Academy of Sciences*, *1173*.

Gomm, R., Hammersley, M., & Foster, P. (Eds.). (2000). *Case study method: Key issues, key texts*. London: Sage.

Goodwin, M. A., Stange, K. C., Zyzanski, S. J., Crabtree, B. F., Borawski, E. A., & Flocke, S. A. (2017). 'The Hawthorne effect in direct observation research with physicians and patients'. *Journal of evaluation in clinical practice*, *23*(6).

Gorard, S. (2003) *Quantitative Methods in Social Science*. London: Continuum.

Gove, M. (2010) *Education Speech to the National College*. Available at: https://www.gov.uk/government/speeches/michael-gove-to-the-national-college-annual-conference-birmingham (Accessed: 16th October 2018).

Grandjean, A. and Campbell, S. (2004). *Hydration: Fluids for Life*. A monograph by the North American Branch of the International Life Science Institute. ILSI North America: Washington, DC.

Grandjean, A. C., & Grandjean, N. R. (2007). 'Dehydration and cognitive performance'. *Journal of the American College of Nutrition*, 26(5).

Groff, R. (2004). *Critical realism, post-positivism and the possibility of knowledge*. London: Routledge.

Guba, E. G., & Lincoln, Y. S. (1994). 'Competing paradigms in qualitative research'. In Denzin, N. K. & Lincoln Y. S. (Eds.). *Handbook of qualitative research*. London: Sage.

Hammersley, M., & Atkinson, P. (2007). *Ethnography: Principles in practice*. London and New York: Tavistock Publications.

Hatch, J. A. (2002). *Doing qualitative research in education settings*. Albany: State University of New York Press.

Howells, K. (2012). 'Placing an importance on health and physical activity'. In Griggs, G. *An introduction to primary physical education*. London and New York: Routledge.

Hwang, V. S. (1989). 'Tracking feature points in time-varying images using an opportunistic selection approach'. *Pattern Recognition*, *22*(3).

Irwin, L. G., & Johnson, J. (2005). 'Interviewing young children: Explicating our practices and dilemmas'. *Qualitative health research*, *15*(6).

Johnston-Molloy, C., Gandy, J., Cunningham, C., & Glennon Slattery, C. (2008). 'An exploration of factors that influence the regular consumption of water by Irish primary school children'. *Journal of human nutrition and dietetics*, 21(5).

Jéquier, E., & Constant, F. (2010). 'Water as an essential nutrient: the physiological basis of hydration'. *European journal of clinical nutrition*, 64(2).

Kaushik, A., Mullee, M. A., Bryant, T. N., & Hill, C. M. (2007). 'A study of the association between children's access to drinking water in primary schools and their fluid intake: can water be 'cool'in school?'. *Child: care, health and development*, 33(4).

Kenney, W. L., & Chiu, P. (2001). 'Influence of age on thirst and fluid intake'. *Medicine and science in sports and exercise*, 33(9).

Kent Public Health Observatory, (2016). *Analysis of Deprived Areas*. Available at: https://www.kpho.org.uk/__data/assets/pdf_file/0010/58834/Thanet-Profile.pdf. (Accessed: 20th December 2018).

Kleiner, S. M. (1999). 'Water: an essential but over looked nutrient'. *Journal of the American Dietetic Association*, 99(2).

Landsberger, H. A. (1958). *Hawthorne Revisited*. New York: The New York State School of Industrial and Labor Relations.

Lean, M. E., & Hankey, C. R. (2004). *Aspartame and its effects on health.* Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC520987/. (Accessed: 12th November 2018).

Levene, H. (1961). 'Robust Tests for Equality of Variances'. In Olkins, I. *Contributions to Probability and Statistics*. Stanford: Stanford University Press.

Lieberman, H. R. (2007). 'Hydration and cognition: a critical review and recommendations for future research'. *Journal of the American College of Nutrition*, 26(5).

Likert, R. (1932). 'A technique for the measurement of attitudes'. *Archives of psychology*.

Loughridge, J. L., & Barratt, J. (2005). 'Does the provision of cooled filtered water in secondary school cafeterias increase water drinking and decrease the purchase of soft drinks?'. *Journal of human nutrition and dietetics*, *18*(4).

Louise-Barriball, K., & While, A. (1994). 'Collecting Data using a semi-structured interview: a discussion paper'. *Journal of advanced nursing*, *19*(2).

Mackenzie, A., Barnes, G., & Shann, F. (1989). 'Clinical signs of dehydration in children'. *The Lancet*, 334(8663).

Maslow, A. H. (1954). *Motivation and Personality*. New York: Harper and Row.

Melton, A. W. (1963). *Implications of short-term memory for a general theory of memory*. Michigan University Institute of Science and Technology.

Mercola, J. (2014). *How Artificial Sweeteners Confuse Your Body into Storing Fat and Inducing Diabetes*. Available at: https://articles.mercola.com/sites/articles/archive/2014/12/23/artificial-sweeteners-confuse-body.aspx. (Accessed: 12th November 2018).

Miserandino, M. (1996). 'Children who do well in school: Individual differences in perceived competence and autonomy in above-average children'. *Journal of educational psychology*, 88(2).

Myers, M. G., Valdivieso, M., & Kiss, A. (2009). 'Use of automated office blood pressure measurement to reduce the white coat response'. *Journal of hypertension*, 27(2).

National Health Service, (2015). *Model Specification for Children and Adolescent mental health Services: targeted and Specialist levels.* Available at: https://www.england.nhs.uk/wp-content/uploads/2018/04/mod-camhs-tier-2-3-spec.pdf. (Accessed: 7th May 2019).

NHS Choices, (2011). *Water and drinks*. Available at: http://www.nhs.uk/Livewell/Goodfood/Pages/water-drinks.aspx. (Accessed: 9th November 2018).

Northstone, K., Rogers, I., & Emmett, P. (2002). 'Drinks consumed by 18-month-old children: are current recommendations being followed?'. *European journal of clinical nutrition*, *56*(3).

Ofsted, (2014). *Are you Ready? Good practice for School Readiness.* Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/418819/Are_you_ready_Good_practice_in_school_readiness.pdf. (Accessed: 17th April 2019).

Ofsted, (2015) *School Inspection Handbook.* Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/553940/School_inspection_handbook-section_5.doc (Accessed: 16th October 2018).

O'Leary, Z. (2004). *The essential guide to doing research*. UK: Sage.

Patel, A. I., & Hampton, K. E. (2011). 'Encouraging consumption of water in school and child care settings: access, challenges, and strategies for improvement'. *American journal of public health,* 101(8).

Paxton, S. J., Wertheim, E. H., Gibbons, K., Szmukler, G. I., Hillier, L., & Petrovich, J. L. (1991). 'Body image satisfaction, dieting beliefs, and weight loss behaviors in adolescent girls and boys'. *Journal of youth and adolescence*, *20*(3).

Petter, L. P., Hourihane, J. B., & Rolles, C. J. (1995). 'Is water out of vogue? A survey of the drinking habits of 2-7 year olds'. *Archives of disease in childhood*, 72(2).

Popper, K. (1959). *The logic of scientific discovery*. London: Routledge.

Public Health England, (2019). *Change4Life Resource Overview*. Available at: https://campaignresources.phe.gov.uk/resources/campaigns/84-2019-change4life-nutrition-campaign. (Accessed: 3rd May 2019).

Public Health England, (2019). National Diet and Nutrition Survey. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/772434/NDNS_UK_Y1-9_report.pdf (Accessed: 21st March 2019).

Pyszczynski, T., Greenberg, J., & Solomon, S. (1997). 'Why do we need what we need? A terror management perspective on the roots of human social motivation. *Psychological inquiry*, 8(1).

Rolfe, G. (2006). 'Validity, trustworthiness and rigour: quality and the idea of qualitative research'. *Journal of advanced nursing*, *53*(3).

Rural Payments Agency, (2017). *Eligibility for the school milk subsidy scheme*. Available at: https://www.gov.uk/guidance/eligibility-for-the-school-milk-subsidy-scheme-milk-consumed-from-1-august-2017 (Accessed: 22nd March 2019).

Saltmarsh, M. (2001). 'Thirst: or, why do people drink?'. *Nutrition Bulletin*, 26(1).

Sawka, M. N., Cheuvront, S. N., & Carter III, R. (2005). 'Human water needs'. *Nutrition reviews*, 63(1).

Scotland, J. (2012). 'Exploring the Philosophical Underpinnings of Research: Relating Ontology and Epistemology to the Methodology and Methods of the Scientific, Interpretive, and Critical Research Paradigms'. *English language teaching*, *5*(9).

Severs, W. B. (1979). 'Homeostatic versus non-homeostatic drinking behavior: an observation, criticism, and hypothesis for discussion'. *Behavioral and Brain Sciences*, 2(1).

Sibley, B. A., & Etnier, J. L. (2003). 'The relationship between physical activity and cognition in children: a meta-analysis'. *Pediatric exercise science*, *15*(3).

Shaw, V. (2010). *Hydration in infants and children*. Available at: https://www.nutrition.org.uk/attachments/442_Shaw.pdf. (Accessed: 9th November 2018).

Smith, J., & Noble, H. (2014). 'Bias in research'. *Evidence-based nursing*, *17*(4).

Stand, A. P. (2009). 'Exercise and fluid replacement'. *Medicine and science in sports and exercise*, 39(2).

Stookey, J. D., Constant, F., Gardner, C. D., & Popkin, B. M. (2007). 'Replacing sweetened caloric beverages with drinking water is associated with lower energy intake'. *Obesity*, 15(12).

Sutton, S., French, D. P., Hennings, S. J., Mitchell, J., Wareham, N. J., Griffin, S., & Kinmonth, A. L. (2003). 'Eliciting salient beliefs in research on the theory of planned behaviour: The effect of question wording'. *Current Psychology*, *22*(3).

Tashakkori, A., & Creswell, J. W. (2007). 'The new era of mixed methods'. *Journal of Mixed Methods Research*, 1(3).

The British Association for Early Childhood Education, (BAECE) (2012). *Development Matters in the Early Years Foundation Stage*. Available at: https://www.foundationyears.org.uk/files/2012/03/Development-Matters-FINAL-PRINT-AMENDED.pdf (Accessed: 9th November 2018).

The Marketing Society, (2012). *Recipe for success with Change4Life.* Available at: https://www.marketingsociety.com/the-library/recipe-success-change4life#iEK9xw7OC7t0cF2y.97 (Accessed: 3rd May 2019).

Thomas, G. (2017). *How to Do Your Research Project: A Guide for Students*. London: Sage.

Trost, J. E. (1986). 'Statistically non-representative stratified sampling: A sampling technique for qualitative studies'. *Qualitative sociology*, *9*(1).

University of Sheffield, (2018). *Ethical Considerations in Research with Children and Young People.* Available at: https://www.sheffield.ac.uk/polopoly_fs/1.165641!/file/SREGP-Children-Young-People.pdf (Accessed: 17th April 2019).

Valtin, H. (2002). '"Drink at least eight glasses of water a day." Really? Is there scientific evidence for 8× 8"?'. *American Journal of Physiology-Regulatory, Integrative and Comparative Physiology*, 283(5).

Van Belzen, L., Postma, E. M., & Boesveldt, S. (2017). 'How to quench your thirst. The effect of water-based products varying in temperature and texture, flavour, and sugar content on thirst'. *Physiology & behavior*, 180.

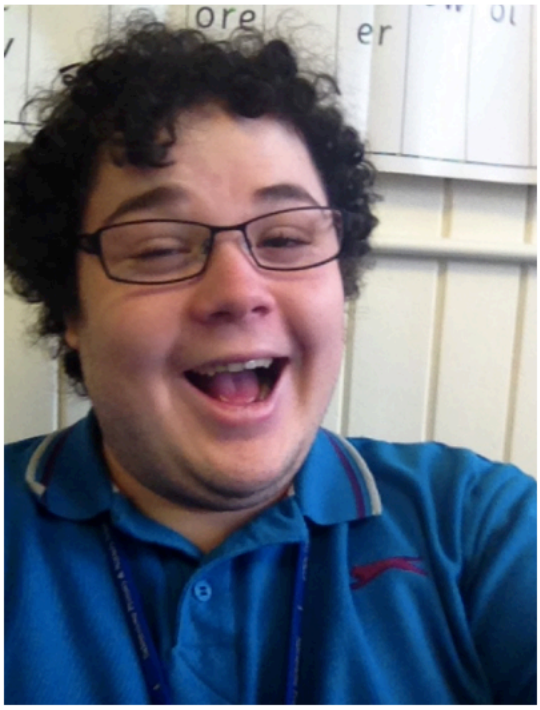
Vygotsky, L. S. (1978) *Mind in society: The development of higher psychological processes*. Cambridge: Harvard University Press.

Wells, J. C. K., Fewtrell, M. S., Davies, P. S. W., Williams, J. E., Coward, W. A., & Cole, T. J. (2005). 'Prediction of total body water in infants and children'. *Archives of disease in childhood,* 90(9).

World Health Organization, (2004). *Guidelines for drinking-water quality: recommendations (Vol. 1)*. World Health Organization.

World Health Organization, (2007). *Average Weight for boys 5-10*. Available at: https://www.who.int/growthref/wfa_boys_%205_10years_per.pdf?ua=1. (Accessed: 10th November 2018).

## ***Appendix 1 – Personal Rationale***




Left, January 2014. Right, February 2018.

Up until my late teenage years, I weighed nearly eighteen stone, ate an unhealthy diet, including too many cakes, fizzy drinks and little water (Appendix 1). This regime continued for far too long, and in turn instigated the decision to lose weight and be healthy. Four years on, I have lost seven stone and live a far healthier lifestyle, to which in my opinion, drinking water exclusively for the duration of the weight loss, was mainly attributable due to the nil calories (Paxton et al, 1991). However, due to this personal standpoint, I do recognise that there is a positional bias in play (Gomm, Hammersley & Foster, 2000) due to myself drinking the correct volume of fluid every day. But because of the strong emphasis on quantitative data collection methods, it will allow myself to detach any feelings towards the data and look purely at what is there (Cohen, Manion and Morrison, 2018). This hence allows myself as the researcher to negate any potential favouritism in the statistics because of the numeral nature of the data. Cohen, Manion and

Morrison (2018) continue to state that as long as any researcher is upfront and discloses any potential bias in their work, it allows the research to be more reliable, because the researcher themselves are conscious to the fact they could swing more preferably towards one possible viewpoint, especially when analysing the data. Thus, due to this consciousness, it permits myself as the researcher to refrain from this practice, and in turn create the most accurate insight into what is being researched. With this in mind, the fact that I have this passion for consuming water, it could in turn be theorised that in order to make a success of the research, I could ignore certain answers from the young participants. But, as I have disclosed this facet of my personal wellbeing, I am therefore conscious to not discard answers that could contradict my findings, and hence create the most rounded picture possible of the current discourse.

## ***Appendix 2 – Canterbury Christ Church University Ethics Committee Approval***

Canterbury Christ Church University

**18/EDU/005** **8th January 2019**

Dear Josh,

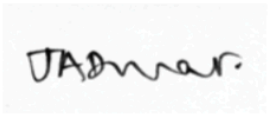
**Project title**: *Reception children's understanding of fluid intake.*

Further to the email from Judy Durrant, this is formal confirmation of the approval of your ethics application by Chairs Action.

Please do let us know when you have completed the work so that we can update our records.

Good luck with this study!

Yours sincerely,



Dr Judy Durrant
Chair, Faculty of Education Research Ethics Committee.

## *Appendix 3 – School's Gatekeeper Consent Forms*

Canterbury Christ Church University

### Consent Form (Gatekeeper)

**Title of Project: Reception children's understanding of fluid intake.**
**Name of Researcher: Josh Williamson**

**Contact details:**

Address: Canterbury Christ Church University
North Holmes Road
CT1 1QU
Canterbury
United Kingdom

Email: j.williamson784@canterbury.ac.uk

**Please initial box**

| | |
|---|---|
| 1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions on behalf of the children. | JG |
| 2. I understand that the children's participation is voluntary and that they are free to withdraw at any time, without giving any reason. | JG |
| 3. I understand that any personal information that the children may provide to the researcher will be kept strictly confidential. | JG |
| 4. I agree for the children to take part in the above study. | JG |

School1
Name of School

10.1.19 A. Hayward
Date Gatekeeper Signature

Josh Williamson
Researcher (Josh Williamson)

10/1/19 Josh Williamson
Date Signature

Copies: 1 for participant
1 for researcher

Canterbury Christ Church University

## Consent Form (Gatekeeper)

**Title of Project: Reception children's understanding of fluid intake.**
**Name of Researcher: Josh Williamson**

**Contact details:**


Address: Canterbury Christ Church University
North Holmes Road
CT1 1QU
Canterbury
United Kingdom

Email: j.williamson784@canterbury.ac.uk


**Please initial box**

| | |
|---|---|
| 1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions on behalf of the children. | ✓ |
| 2. I understand that the children's participation is voluntary and that they are free to withdraw at any time, without giving any reason. | ✓ |
| 3. I understand that any personal information that the children may provide to the researcher will be kept strictly confidential. | ✓ |
| 4. I agree for the children to take part in the above study. | ✓ |

School 2
Name of School

16.1.19
Date Gatekeeper Signature

Researcher (Josh Williamson)

16/1/19
Date Signature

Copies: 1 for participant
1 for researcher

Canterbury Christ Church University

## Consent Form (Gatekeeper)

**Title of Project: Reception children's understanding of fluid intake.**
**Name of Researcher: Josh Williamson**

**Contact details:**


Address: Canterbury Christ Church University
North Holmes Road
CT1 1QU
Canterbury
United Kingdom

Email: j.williamson784@canterbury.ac.uk


| | Please initial box |
|---|---|
| 1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions on behalf of the children. | ✓ |
| 2. I understand that the children's participation is voluntary and that they are free to withdraw at any time, without giving any reason. | ✓ |
| 3. I understand that any personal information that the children may provide to the researcher will be kept strictly confidential. | ✓ |
| 4. I agree for the children to take part in the above study. | ✓ |

School 3
Name of School

23-1-19 [signature] [signature]
Date Gatekeeper Signature

J. williamson
Researcher (Josh Williamson)

23/1/19 J. williamson
Date Signature

Copies: 1 for participant
1 for researcher

Canterbury Christ Church University

## Consent Form (Gatekeeper)

**Title of Project: Reception children's understanding of fluid intake.**
**Name of Researcher: Josh Williamson**

**Contact details:**


Address: Canterbury Christ Church University
North Holmes Road
CT1 1QU
Canterbury
United Kingdom

Email: j.williamson784@canterbury.ac.uk


| | Please initial box |
|---|---|
| 1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions on behalf of the children. | ✓ |
| 2. I understand that the children's participation is voluntary and that they are free to withdraw at any time, without giving any reason. | ✓ |
| 3. I understand that any personal information that the children may provide to the researcher will be kept strictly confidential. | ✓ |
| 4. I agree for the children to take part in the above study. | ✓ |

School 4

Name of School

Date Gatekeeper Signature

Josh Williamson

Researcher (Josh Williamson)

31/1/19 J. Williamson

Date Signature

Copies: 1 for participant
1 for researcher

## ***Appendix 4 – Questionnaire from Child's Perspective***

# Reception children's understanding of fluid intake

Thanks for your participation. We would like your help by asking you some questions about your drinking habits.
There are no right or wrong answers.

1) Are you a boy or a girl?

- ○ Boy
- ○ Girl

2) How old are you?

- ○ 4
- ○ 5

3) What month were you born?

- ○ January
- ○ February
- ○ March
- ○ April
- ○ May
- ○ June
- ○ July
- ○ August
- ○ September
- ○ October
- ○ November
- ○ December
- ○ I don't Know

4) What is the name of your school?

Short answer text

4a) How many brothers do you have? (Older or Younger?)

Long answer text

4b)How many sisters do you have? (Older or Younger?)

Long answer text

5) When do you get most thirsty? As in, when do you really want a drink? (Open Question)

Long answer text

5a) Why do you think drinking is important? (Open Question)

Long answer text

6) On a scale of 1- 3, how often do you get thirsty after lunch time?

- 1 - Never get thirsty
- 2 - Sometimes get thirsty
- 3 - Always get thristy
- Not answered

7) Do you get hot and thirsty at lunchtime? If yes, what kind of things are you doing when you get hot and thirsty at lunchtime? (Open Question)

Long answer text

8) If you had to guess, how much do you think you drink in a day?

- ◯ Half a bottle (250ml)

- ◯ One bottle (500ml)

- ◯ Two bottles (1L)

- ◯ Three bottles (1.5L)

- ◯ Four bottles (2L)



- ◯ More than four bottles



- ◯ Don't know

8a) How many of those bottles do you think you drink AT SCHOOL?

- ○ Half a bottle (250ml)

- ○ One bottle (500ml)

- ○ Two bottles (1L)

- ○ Three bottles (1.5L)

- ○ Four bottles (2L)

- ○ More than four bottles



- ○ Don't know

9) How much do you think you should drink in a day when you DO go outside onto the playground at lunchtime?

- ◯ Half a bottle (250ml)

- ◯ One bottle (500ml)

- ◯ Two bottles (1L)

- ◯ Three bottles (1.5L)

- ◯ Four bottles (2L)



- ◯ More than four bottles



- ◯ Don't know

10) How much do you think you should drink a day when you DO NOT go outside onto the playground at lunchtime? (so wet play lunchtime)

- ○ Half a bottle (250ml)

- ○ One bottle (500ml)

- ○ Two bottles (1L)

- ○ Three bottles (1.5L)

- ○ Four bottles (2L)

- ○ More than four bottles



- ○ Don't know

11) When do you drink your first drink of the day? (Open Question)

Short answer text

12) Who tells you when to drink? (Open Question)

Long answer text

13) Are you allowed to drink in the school day, if so when? (Open Question) (Are there any other times?)

Long answer text

14) Is there ever a time you are not allowed to drink in the school day? If so when? (Open Question) (Are there any other times?)

Long answer text

15) If you were really thirsty and given the choice to play with the toys right away or have a drink then play with the toys, What would you choose?

- ○ Play with the toys right away
- ○ Have a drink then play with the toys
- ○ Don't Know
- ○ Other...

16) What's your favourite drink? (Open Question)

Long answer text

## ***Appendix 5 – Questionnaire from Researchers Perspective***

# Reception children's understanding of fluid intake

Thanks for your participation. We would like your help by asking you some questions about your drinking habits.
There are no right or wrong answers.

1) Are you a boy or a girl?

- ○ Boy
- ○ Girl

2) How old are you?

- ○ 4
- ○ 5

3) What month were you born?

- ○ January
- ○ February
- ○ March
- ○ April
- ○ May
- ○ June
- ○ July
- ○ August
- ○ September
- ○ October
- ○ November
- ○ December
- ○ I don't Know

4) What is the name of your school?

Short answer text

4a) How many brothers do you have? (Older or Younger?)

Long answer text

4b)How many sisters do you have? (Older or Younger?)

Long answer text

5) When do you get most thirsty? As in, when do you really want a drink? (Open Question)

- Before school
- When you get to school
- At morning snack time
- Just before lunchtime
- At lunchtime
- Straight after lunch
- In the afternoon
- At afternoon snack time
- When you get home
- Don't Know

5a) Why do you think drinking is important?

Long answer text

6) On a scale of 1- 3, how often do you get thirsty after lunch time?

- ○ 1 - Never get thirsty
- ○ 2 - Sometimes get thirsty
- ○ 3 - Always get thristy
- ○ Not answered

7) Do you get hot and thirsty at lunchtime? If yes, what kind of things are you doing when you get hot and thirsty at lunchtime? (Open Question)

- ☐ Never get hot and thirsty
- ☐ Running
- ☐ Walking
- ☐ Skipping
- ☐ Ball games
- ☐ Other form of physical actvity
- ☐ I just talk to my friends
- ☐ Other form of non physical activity
- ☐ Playing on the apparatus
- ☐ Can not describe
- ☐ Other...

8) If you had to guess, how much do you think you drink in a day?

- ○ Half a bottle (250ml)

- ○ One bottle (500ml)

- ○ Two bottles (1L)

- ○ Three bottles (1.5L)

- ○ Four bottles (2L)



- ○ More than four bottles



- ○ Don't know

8a) How many of those bottles do you think you drink AT SCHOOL?

- ○ Half a bottle (250ml)

- ○ One bottle (500ml)

- ○ Two bottles (1L)

- ○ Three bottles (1.5L)

- ○ Four bottles (2L)

- ○ More than four bottles



- ○ Don't know

9) How much do you think you should drink in a day when you DO go outside onto the playground at lunchtime?

- ◯ Half a bottle (250ml)

- ◯ One bottle (500ml)

- ◯ Two bottles (1L)

- ◯ Three bottles (1.5L)

- ◯ Four bottles (2L)



- ◯ More than four bottles



- ◯ Don't know

10) How much do you think you should drink a day when you DO NOT go outside onto the playground at lunchtime? (so wet play lunchtime)

- ○ Half a bottle (250ml)

- ○ One bottle (500ml)

- ○ Two bottles (1L)

- ○ Three bottles (1.5L)

- ○ Four bottles (2L)

- ○ More than four bottles



- ○ Don't know

11) When do you drink your first drink of the day? (Open Question)

- ◯ When I wake up
- ◯ Breakfast
- ◯ When I get to school
- ◯ Morning snack
- ◯ Lunchtime
- ◯ Afternoon
- ◯ Afternoon snack
- ◯ When I get home from school
- ◯ Dinner
- ◯ When I go to bed
- ◯ Other...

12) Who tells you when to drink? (Open Question)

- [ ] No one/Myself
- [ ] Mum
- [ ] Dad
- [ ] Guardian
- [ ] Teacher
- [ ] Teaching Assistant
- [ ] Friend
- [ ] Other adult in school
- [ ] Gran
- [ ] Grandad
- [ ] Younger Brother
- [ ] Younger Sister
- [ ] Older Brother
- [ ] Older Sister
- [ ] Don't Know
- [ ] Other...

13) Are you allowed to drink in the school day, if so when? (Open Question) (Are there any other times?)

- [ ] No never get a chance
- [ ] When I first get to school
- [ ] Morning snack
- [ ] Lunch time
- [ ] After lunch
- [ ] Afternoon
- [ ] At home time
- [ ] All the time
- [ ] Don't know
- [ ] Other...

14) Is there ever a time you are not allowed to drink in the school day? If so when? (Open Question) (Are there any other times?)

- [ ] When I first get to school
- [ ] When I'm Learning on the carpet
- [ ] When I'm playing in child initiated
- [ ] In the Morning
- [ ] In the afternoon
- [ ] Afternoon snack
- [ ] Never a time
- [ ] Don't know
- [ ] In the playground
- [ ] At Home Time
- [ ] Other...

15) If you were really thirsty and given the choice to play with the toys right away or have a drink then play with the toys, What would you choose?

- ◯ Play with the toys right away
- ◯ Have a drink then play with the toys
- ◯ Don't Know
- ◯ Other...

16) What's your favourite drink? (Open Question)

- ◯ Water/Carbonated Water
- ◯ Flavoured Squash
- ◯ Sugary Fizzy Drink
- ◯ Diet Fizzy Drink
- ◯ Fruit Concentrated Juice
- ◯ Milk
- ◯ Milk Shake
- ◯ Hot Chocolate
- ◯ Tea/Coffee
- ◯ Smoothies
- ◯ Don't Know
- ◯ Other...

## ***Appendix 6 – Visual Water Bottles, After lunch Thirst Chart and Toy Dinosaur***







## ***Appendix 7 – Participant approval script***

As long as you are happy to, I am going to ask you a list of questions on my iPad all about you drinking water. Some of the questions that I will ask you are: How much you think you drink? Why you think drinking is important? And what makes you want to have a drink? As well as some other questions. If you don't know an answer to a question, that is absolutely ok, just say "I don't know", and we will move on.

You do not have to take part in the questionnaire if you don't want to, and if you want to stop at any time, just let me know. I will use your answers to write a big long report, so if you want me to get rid of what you say to me, even if we have finished, that is also ok.

Would you like to take part in the research and answer the questions?

***Appendix 8 – Special Educational Needs Arrangements for marking considerations***

# Special Arrangements Coversheet for Examinations and Assignments

| |
|---|
| **Candidate number:** 9467683 |
| **Details of the special consideration agreed by the Academic Registrar**<br>• **15 minutes of extra time per examination hour.**<br>• **Consideration for spelling, grammar and structuring of written work.**<br>• **Use of a University PC for examinations.**<br>• **Use of a Reader and Scribe for examinations.** |

**Notice to academic staff: See instructions on the reverse of this sheet.**

Please mark the attached assignment or paper in the usual way before applying consideration in line with the arrangements detailed above. Please sign below to confirm that you have given consideration to the arrangements detailed above.

Name of marker.....
Signature.....Date..... Name of marker..... Signature.....Date.....

Signature of Disability Adviser

M. AScott

Note to student: print this document double-sided

## Instructions to Staff  Please follow this flow chart

### To the Programme Director

Please pass this coversheet to the person/people marking this paper, to inform them about the special arrangements (shown overleaf) granted to the student.

### To the Marker/s

Please make sure that the special arrangements (shown overleaf) have been applied, after the work has been blind marked.

You should then sign, as indicated, on the front of the sheet and return it to the Programme Director.

**To the Programme Director**

When the completed sheet has been returned to you by the marker, please forward it to the Deputy Chair for presentation to the Board of Examiners.

**To the Board of Examiners**

Please minute that the special arrangements have been applied and retain the coversheet on file within the academic department for the period of time outlined by the University's procedures.

Note to student: print this document double-sided