Location Tracking Devices for Children: Harmful or Helpful?

An exploratory research on parental beliefs and willingness to adopt LTD technology for children.

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1. Introduction

Over recent generations, children's independent mobility - defined as the freedom to roam the neighbourhood without adult supervision - has decreased in many developed countries (i.a. Fyhri et al., 2011; McMillan, 2005, 2007, in Foster, Villanueva, Wood, Christian & Giles-Corti, 2014). Parental anxiety over children's safety proves to be one of the most significant influences on whether children have the opportunity to play and roam the neighbourhood without adult supervision (Valentine & McKendrick, 1997). Due to parental concerns, children's play is increasingly being relocated to domestic and institutionalized environments and both in- and outdoor play is becoming more supervised (Valentine & McKendrick, 1997; Pain et al., 2005). The supervision can negatively affect children's autonomy, social interaction skills, problem solving skills and even their health (i.a. Devereaux, 1976, in Valentine & McKendrick, 1977; i.a. Hillman et al., 1990, in Pain et al., 2005). This indicates that it is important for children to be able to independently play and move (outdoors) in order to develop social and cognitive skills. Other research confirms this, stating that children's free mobility and their freedom to play outdoors bring about developmental, health and social benefits (Badland & Oliver, 2012, in Foster et al., 2014).

Mobile phones are seen as devices that may encourage children's independent mobility outdoors (Pain et al., 2005). This is because mobile phones have brought remote surveillance (Green, 2002b, in Pain et al., 2005), enabling parents to monitor and possibly control children's movements and communication, alongside the possibility of parents and children to contact one another whenever and wherever desired. Because of the possibilities for surveillance and communication, mobile phones may reduce parental fears regarding their child's safety, and thereby potentially relax constraints that parents impose on children's independent mobility (Pain et al., 2005).

New mobile location-tracking technologies increase the potential for surveillance even further by giving real-time information on a user's whereabouts. Location-tracking devices give parents the opportunity to 'chip' their child either internally (although this remains a theoretical idea) or externally (by equipping their child with a tracking device). This enables parents to always know exactly where their child is.

Marketers of child-oriented location-tracking devices claim that with these devices children are safer when playing outdoors independently, because parents can keep an indirect eye on them by means of the real-time locational information. The real-time information, for example, is believed to enable parents or emergency services to timely intervene when the locational data indicates that the child is in distress. This information supposedly diminishes

parental concerns regarding the child's safety. Location-tracking technologies are thus marketed as technologies that stimulate children's independent outdoor mobility by reducing parental fears, which in turn may stimulate children's social and cognitive development.

A brief search on blog articles and fora (i.a. MissStar1, 2012 October 4; Ulanoff, 2007 August 29; GPS Tracker For Kids, n.d.), however, reveals that the notion of using LTDs (Location Tracking Devices) to monitor children outdoors causes quite some commotion, and that parental opinions regarding the use of LTDs are diverse. A rough dichotomy can be made: some parents believe that LTDs can ultimately provide their young and dependent children with safety. On the other hand, other parents believe that LTDs infringe on their child's right to autonomy and independence. This dichotomy in parental beliefs represents the ambiguity of using LTDs for children: while they are meant to diminish parental concerns and increase a child's safety outdoors, they can also be considered as devices that negatively affect the child's autonomy and/or independence.

A pertinent question is what kind of parents are inclined to use LTDs, and which factors predict parental beliefs towards this technology and parental intentions to use it. To date, little is known about parental beliefs towards LTDs for children, and what factors influence these beliefs. Hence, the two research questions guiding this study are (1) *what factors influence parental beliefs regarding LTDs for children?,* and (2) *do parental beliefs regarding LTDs for children influence their willingness to adopt these devices?* Since the notion of LTDs for children is rather new and cannot be considered a commonly used technological device among families, this study mainly talks about willingness to adopt, rather than actual use.

This study explores two factor types: a range of socio-demographics and a psychological factor, namely parental fear of strangers. By drawing from the results of a survey among 98 parents of children aged 8-12, these factors are related to parental beliefs regarding the LTD technology for children and parental willingness to adopt an LTD for their child.

By answering the main research questions, it can be determined what contextual and psychological factors influence parental beliefs regarding this new technology that is not yet fully developed or implemented in families' everyday lives. Furthermore, it can be determined to what extent certain beliefs about the technology explain why some parents are more willing to adopt LTDs for their child than others. An additional aim of this study is to provide insight in how technology, in this case LTDs, can play a role in the complex interaction between parents, their children and the environment our in contemporary society.

2. Theoretical framework

2.1.Location Tracking Devices: improved surveillance

Location-tracking technologies are one category of a range of Location Based Services (LBS) – services that incorporate users' locations in order to fulfil specific tasks. Not one, but several technologies enable location-tracking, such as GPS (Global Positioning System), RFID (Radio Frequency Identification), GIS (Geographic Information Systems), and WLAN (Wireless Local Area Network) (Bonsor, 2001). Which technology(-gies) will be used, depends on the object to be tracked and the associated area; whereas GPS is suitable for tracking over large areas, RFID or WLAN are more suitable for small and/or indoor areas (Bonsor, 2001).

Today, research on the use of Location Tracking Devices in relation to children's free play and independent mobility outdoors is lacking. There are, however, various studies on mobile *communication* technology (i.a. Weisskirch, 2010; Pain et al., 2005). These studies reveal that most parents give their child a mobile phone to monitor them, thereby creating a sense of security for both parties (Pain et al., 2005). This way, children can be provided with a wider, less supervised spatial range (Pain et al., 2005) as parental concerns about their child's safety diminish.

However, there are a number of problems regarding the reliability of mobile phones as tools to monitor a child. For instance, children have the opportunity to limit or alter the information they share with their parents (Pain et al., 2005), or they may be unable to make a phone call when in distress. The surveillance potential can thus be subverted by children or by the circumstances in which they find themselves. Location Tracking Devices, either in the form of an application installed on a mobile phone or a separate device, can offer a more stable and reliable method to monitor a child's location outdoors.

Location Tracking Devices provide advanced methods to determine a child's whereabouts (potentially increasing a child's safety). The key difference between (implanted) LTDs and other devices, such as mobile phones, is that the data transmission is continuous. An LTD's real-time locational data is accurate, readily available, and cannot be altered by the child. In case of a separate device, for example sewed into a piece of clothing, the child will be unable to disable the device, except by removing the clothing. Because the locational information can be retrieved instantaneously at any time (real-time) without the child's collaboration, an LTD possibly enables parents or emergency services to timely intervene when a child's locational information indicates the child is potentially in danger. This is

believed to diminish parental concerns about children's safety, thereby increasing children's opportunities for outdoor independent mobility.

2.2.Parental beliefs regarding LTDs and parental willingness to adopt LTDs

As previously mentioned, a rough dichotomy seems to be present when it comes to parental beliefs regarding LTDs (i.a. MissStar1, 2012 October 4; Ulanoff, 2007 August 29; GPS Tracker For Kids, n.d.): on the one hand, there appear to be parents who believe that LTDs can ultimately provide their children with safety. On the other hand, there appear to be parents who believe that LTDs can infringe their child's right to autonomy and independence. These variations in parents' openness towards versus their aversion to the use of LTDs to monitor children, can be explained by looking at childhood and parenting practices in contemporary *world risk society*.

2.2.1. Parental beliefs regarding LTDs

Risk is considered a modern-day concept that inherently incorporates the concept of control (Beck, 2002). *Risk* suggests that one has, to a certain extent, control over present and/or forthcoming situations by means of risk-calculation and subsequent decision-making (Beck, 2002). A main characteristic of our so-called contemporary *world risk society* is people's pretence of having control over matters that are uncontrollable, not only in politics, science or technology, but also in everyday life (Adam, 2002; Beck, 1992, 1999; Featherstone, 2000; Giddens, 1994; Latour, 2002; van Loon, 2000, in Beck, 2002).

External dangers to a child's safety, for instance child abduction, can be considered such uncontrollable risks. Parents will try to control these uncontrollable risks by trying to calculate the risks around them and subsequently making the 'right' decisions to avoid them. A way to control these external risks may be to make use of an LTD. Parental decisions to equip their child with a mobile phone or Location Tracking Device in order to monitor him/her, can thus be seen as an illustration of modern day *risk society*, as these decisions can be regarded as exemplary for parents' attempts to 'control the uncontrollable'; in this case their child's safety outdoors.

LTDs may alleviate parental fears of potential *risks* by offering a sense of control through the monitoring of their children; the sense of control may cause parents to believe that their child's safety is better preserved outdoors. When the use of such technologies relaxes parental constraints on children to freely and independently play outdoors, the implementation could contribute to children's social and mental development. However, even

though LTDs for children are safety-oriented devices, a child's autonomy and independence may be in jeopardy when a child is constantly monitored.

A fitting and pressing question is to what extent children can be considered autonomous and whether their decisions and behaviour should be monitored and controlled by external forces, be it for their own safety. To be autonomous means to be free to formulate, initiate and complete your own actions, without the interference of influencing external agents, and to accept responsibility for your own behaviour (Baumrind, 1968). The constant monitoring made possible by LTDs can be considered as an influencing external 'agent' that, when used, may negatively affect children's autonomy. For example, parents have the ability to constantly observe their children and intervene whenever they desire to do so. Furthermore, children may act differently outdoors when they are aware of the LTD they are equipped with; they may participate in more risk-taking behaviour, with the feeling that the LTD will 'protect' them from potential dangers, and/or they may become more fearful themselves. When parents are of the opinion that their child's independence is something of high importance, LTDs are likely seen as devices that obstruct children's autonomy, diminishing their freedom to fully determine their own actions and behaviour. This will presumably induce negative feelings and beliefs towards LTD technology.

Based on the previously discussed and observed aspects of parental beliefs regarding LTD technology for children, this study roughly divides parental beliefs into two categories: (1) the belief that LTDs potentially provide children with safety and (2) the belief that LTDs potentially decrease children's autonomy. It is likely that when a parent strongly supports one belief, he/she does not, or to a lesser extent, support the other belief. Therefore the following hypothesis is proposed.

> *Hypothesis 1* | The parental belief that LTD technology provides children with safety is negatively related to the parental belief that LTD technology negatively affects children's autonomy.

2.2.2. Willingness to adopt LTDs

Parental beliefs regarding LTDs for children are likely to influence their willingness to adopt this technology. Davis (1986 in Szajna, 1996) developed the 'Technology Acceptance Model' (TAM), in order to understand why people are willing to accept or reject certain information systems. The original model, which draws from the Theory of Planned Behaviour (Ajzen, 1985, 1987, in Ajzen, 1991), states that a person's intention to use a specific information

system is determined by the user's attitude towards using the information system (Szajna, 1996). A user's attitude, in turn, is formed by the *perceived usefulness* and *perceived ease of use* of the information system (Szajna, 1996).

In case of LTDs for children, the *perceived usefulness* is likely the most influential determinant of the two. This factor is of great importance in the privacy-safety discussion regarding the use of LTDs for young children.

On the basis of Davis' (1986 in Szajna, 1996) Technology Acceptance Model, parents' intention to acquire an LTD for their child depends on parents' attitude/beliefs towards using LTD technology. As the *perceived usefulness* is assumed to be the most influential determinant of parental beliefs towards using the LTD technology, the following assumptions are made: when parents hold the belief that LTDs can provide children with safety, the *perceived usefulness* is likely high, which is expected to positively relate to parents' willingness to adopt an LTD for their child. In contrast, when parents hold the belief that LTDs potentially threaten children's autonomy, the *perceived usefulness* is likely low, which is expected to negatively relate to parents' willingness to adopt an LTD. Therefore, the following hypotheses are proposed.

> *Hypothesis 2* | The parental belief that LTDs negatively affect children's autonomy is negatively related to parental willingness to adopt an LTD for their child.

> *Hypothesis 3* | The parental belief that LTDs provide children with safety is positively related to parental willingness to adopt an LTD for their child.

The assumed relations between parental beliefs regarding LTDs and their willingness to adopt one for their child are presented in Figure 1.

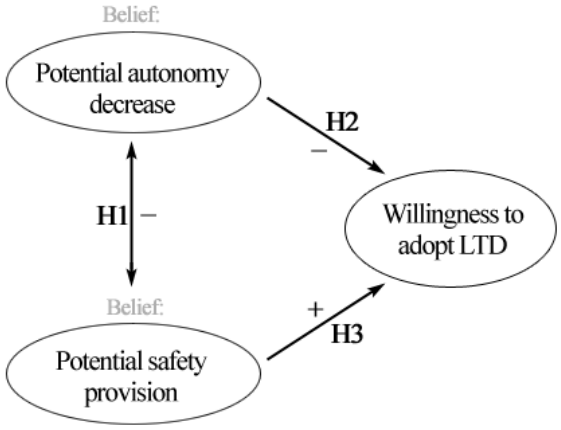

Figure 1 Assumed relations between parental beliefs and parental willingness to adopt an LTD for their child

2.3.Socio-demographic and psychological predictors of parental beliefs regarding LTDs

As previously mentioned, one of this study's objectives is to examine whether certain socio-demographics and one psychological factor (fear of strangers) influence parental beliefs regarding LTDs for children. The factors that are examined in this study will now be discussed.

2.3.1. Parental fear of strangers

As stated earlier, children's independent mobility has decreased. The reasons for the decline in children's independent mobility are often sought in environmental factors, such as the decrease in appropriate and traffic-safe play locations in a child's neighbourhood. However, research shows that sufficient provision of these play locations does not influence children's play behaviour outdoors: even if opportunities are provided, children are not more likely to play outdoors, or further away from home (Valentine & McKendrick, 1997). It appears that *parental anxiety* over children's safety is one of the most significant influences on whether children have the opportunity to play and roam around outdoors independently (Valentine & McKendrick, 1997).

The decrease in children's independent mobility is mainly caused by parental concerns about neighbourhood safety; particularly danger from traffic and contact with strangers (Carver, Timperio, & Crawford, 2008, in Foster et al., 2014). But whereas parental concerns about traffic safety are validated by the fact that traffic accidents are the leading cause of death from injury for children (UNICEF, 2001, in Foster et al., 2014), concerns regarding the potential threats by strangers are largely grounded in fear, probably caused by the global and

abundant news on child abductions in the media (Miller et al., 2008; Shutt et al., 2004, in Foster et al., 2014).

In case of an accident it is likely that bystanders will be aware of the situation and rapidly take action. The visible distress of an injured child enables them to help and report a child's location. In contrast, bystanders are probably less aware of the situation when a child is approached or abducted by a stranger. Especially in the latter case LTDs seem of greater interest as abductions are not always noticed and do not always visibly expose a child's distress. LTDs could thus provide more substantial benefits for abductions (or lost children) than for outdoor injuries in general.

Parents with a strong fear of strangers may tend to be more in favour of LTD technology as it enables them to let their child play outdoors independently while it simultaneously reassures them of their child's safety. Therefore, the following hypothesis is proposed.

> *Hypothesis 4a* | Parents with a stronger fear of strangers have a stronger belief that LTD technology provides children with safety than parents with a weaker fear of strangers.

Parents with a weak fear of strangers may have a stronger aversion to LTD technology as it is likely that they are more concerned with the child's autonomy compared to parents with a strong fear of strangers. Therefore, the following hypothesis is proposed.

> *Hypothesis 4b* | Parents with a weaker fear of strangers have a stronger belief that LTD technology negatively affects children's autonomy than parents with a stronger fear of strangers.

2.3.2. Gender differences

When discussing gender as a predictor of parental beliefs towards LTDs, a differentiation has to be made between the child´s gender, the parent´s, and the interaction between both genders. First, with respect to the child's gender, it is often thought that parents are more concerned about daughters than sons because girls are deemed more vulnerable and defenceless (i.a. Loyd, 1975, in Valentine & McKendrick, 1997). In Valentine and McKendrick's study (1997), however, no significant relationship was found between the child's gender and parents' concerns about his/her safety. While girls may be more vulnerable, they are seen as

mature and brighter to avoid danger in public spaces. And while boys may be physically less vulnerable, they are seen as more irrational and easily led by peers (Valentine, 1997b; Valentine & McKendrick, 1997). Parents thus seem to be equally concerned about sons' and daughters' safety. Therefore, the following hypotheses are proposed.

Hypothesis 5a | Parents of a son have an equally strong belief that LTD technology provides children with safety as parents of a daughter.

Hypothesis 5b | Parents of a son have an equally strong belief that LTD technology negatively affects children's autonomy as parents of a daughter.

Second, with respect to the parent's gender, research has shown that women are usually more fearful compared to men (Hale, 1996, in Foster et al., 2014). Other research on fear of crime also shows that adult women express higher levels of fear and that they perceive risks differently than men: men fear more mundane physical violence while women primarily fear rape and other types of sexual assault (i.a. Stanko, 1995; LaGrange & Ferraro, 1989, in Gustafson, 1998). The fear of rape influences women's perception of other and 'less serious' risks such as robbery; the fear of sexual violence permeates into other situations (Warr, 1985, in Gustafson, 1998). This shows that men and women can perceive risk differently as they focus on different aspects and consequences of risk. This means that mothers possibly perceive risks to their children differently than fathers.

Considering that women express higher levels of fear and that women's fear of rape permeates into other situations, it may be true that mothers are more actively involved with their children's safety compared to fathers. Consequently, being more preoccupied with finding ways to keep their children safe, mothers may be more positive towards LTD technology than fathers.

Hypothesis 6 | Mothers have a stronger fear of strangers than fathers.

Hypothesis 7a | Mothers have a stronger belief that LTD technology provides children with safety than fathers.

As mothers are assumed to have a stronger belief that LTD technology provides children with safety than fathers, it may be true that fathers have a stronger belief that LTD technology

negatively affects children's autonomy than mothers. Therefore the following hypothesis is proposed.

> *Hypothesis 7b* | Fathers have a stronger belief that LTD technology negatively affects children's autonomy than mothers.

Third, with regard to the interaction of the parent's gender with the child's gender, research shows that particularly mothers behave differently towards sons and daughters (Morrongiello & Hogg, 2004). When children misbehave in a situation that could possibly lead to injuries, mothers predominantly express anger to sons' misbehaviour and disappointment to daughters' misbehaviour (Morrongiello & Hogg, 2004). Consequently, mothers mainly focus on safety issues for daughters and discipline issues for sons (Morrongiello & Hogg, 2004). When misbehaviour actually leads to (at least) a moderately serious injury, mothers feel concerned about both sons and daughters yet the anger in reaction to sons' misbehaviour perseveres and the degree of concern is greater for daughters than for sons (Morrongiello & Hogg, 2004).

It is suggested that mothers believe they have little impact to change sons' misbehaviour, attributing sons' misbehaviour to child characteristics rather than to the context or the child's unawareness of risk (Morrongiello & Hogg, 2004). In contrast, daughters' misbehaviour is attributed to the immediate context rather than unawareness of risk or child characteristics (Morrongiello & Hogg, 2004). Considering that mothers appear to be more focused on safety for daughters than for sons, the following hypothesis is proposed.

> *Hypothesis 8a* | Mothers, more so than fathers, feel the belief that LTD technology provides children with safety more strongly for daughters than for sons.

Assuming that the two parental beliefs are opposites and there appears to be no clear-cut reason why fathers would have different beliefs regarding their sons and daughters, the following hypothesis is proposed.

> *Hypothesis 8b* | Both mothers and fathers have an equally strong belief that LTD technology negatively affects children's autonomy with regard to daughter(s) and son(s).

2.3.3. Socioeconomic status

Research has shown that middle class children's activities and use of space are more often supervised by adults than those of working class children (Mercer, 1976, in Valentine & McKendrick, 1997). Middle class children are more likely to participate in organized play, which is more likely to take place outside their own neighbourhood, compared to children from low income areas (Valentine & McKendrick, 1997). This greater parental supervision can be attributed to middle class parents' fears of public spaces. Overprotective middle class parents (of western countries) are said to create so called 'bubble-wrapped children': children whose movement is restricted to such an extent that they are less able to deal with the everyday risks of living in their middle class suburbs (Malone, 2007). The greater participation of middle class children in supervised (i.e. paid-for) activities reflects the more favourable position of middle class parents regarding income and mobility.

While their children are more likely to spend unsupervised time outdoors, lower class parents have less resources to supervise their children and can offer less alternative play opportunities. Therefore, they may depend more on mediated monitoring, rendering it more likely that lower class parents have a stronger belief that LTD technology can potentially increase children's safety compared to higher class parents.

> *Hypothesis 9a* | Parents with a lower socioeconomic status (SES) have a stronger belief that LTD technology provides children with safety compared to parents with a higher socioeconomic status.

Since parents with a higher SES are more likely to have sufficient resources to supervise their children, it is plausible that they focus more on the potential autonomy decrease children may be experiencing to due to LTD technology than parents with a lower SES. Therefore the following hypothesis is proposed.

> *Hypothesis 9b* | Parents with a higher socioeconomic status have a stronger belief that LTD technology negatively affects children's autonomy compared to parents with a lower socioeconomic status.

2.3.4. Marital status

Children of single parents typically spend more time outdoors, experiencing the local neighbourhood (Valentine & McKendrick, 1997). This is because single parents are less able

to offer alternative, private play opportunities (Valentine & McKendrick, 1997). Because they are less able to offer alternatives and consequently are not able to properly supervise their children, single parents may be more positive towards LTDs compared to married couples or couples that live together. By relying on an LTD, single parents could indirectly monitor their child, which may decrease their concerns regarding their child's safety outdoors.

> *Hypothesis 10a* | Single parents have a stronger belief that LTD technology provides children with safety than couples that live together/are married.

As single parents are assumed to concentrate more on properly supervising their children outdoors because they are less likely to have the proper means to do so, it may be true that married couples/couples that live together concentrate more on the child's autonomy as they are likely to have the means to properly supervise their child.

> *Hypothesis 10b* | Married couples/couples that live together have a stronger belief that LTD technology negatively affects children's autonomy than single parents.

2.3.5. Living environment

Research shows that parents that live in urban areas express a much higher level of anxiety about neighbourhood safety than parents that live in suburban areas (Weir, Etelson, & Brand, 2006). As a result, urban children participate in less physical activities compared to suburban children (Weir et al., 2006). Rural children typically have more opportunities to play further away from home and to explore more varied environments (Ward, 1988, 1990, in Valentine & McKendrick, 1997). Taking these studies into account, it is likely that urban parents believe more strongly that LTDs provide children with safety than suburban or rural parents.

> *Hypothesis 11a* | Parents living in urban areas have a stronger belief that LTD technology provides children with safety compared to parents living in suburban or rural areas.

As parents living in suburban/rural areas express a lower level of anxiety about neighbourhood safety compared to parents living in urban areas, and suburban/rural areas are probably perceived as having less possible external dangers, these parents are likely concentrating on the child's autonomy. Therefore the following hypothesis is proposed.

Hypothesis 11b | Parents living in suburban or rural areas have a stronger belief that LTD technology negatively affects children's autonomy compared to parents living in urban areas.

The way in which the above-mentioned socio-demographics and 'fear of strangers' are thought to influence parental beliefs regarding LTDs for children are schematically presented in Figure 2.

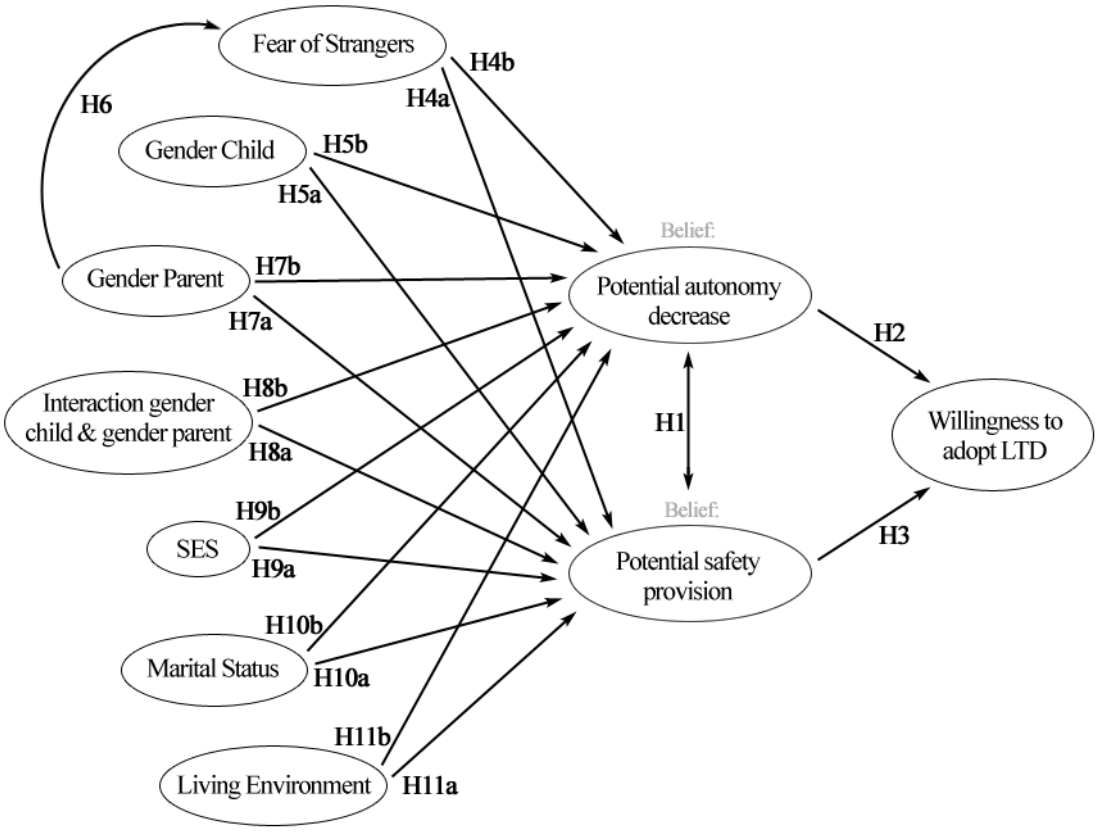

Figure 2 Factors that are thought to influence parental beliefs regarding LTDs for children

3. Method

This study used an online cross-sectional survey as its research method. Dutch and Flemish parents of children aged 8-12 were approached in on- and offline contexts to refer them to an online survey. The survey contained closed questions inquiring after the personal details of the participants and their children, and 20 statements that could be answered on a seven-point Likert scale (completely disagree to completely agree). The statements measured the following constructs: parental fear of strangers, the belief that LTDs decrease children's autonomy, the belief that LTDs provide children with safety, and parents' general willingness to adopt the LTD technology for their child.

3.1.Procedure

A Dutch online survey was distributed to Dutch and Flemish parents in multiple ways. Messages referring to the online survey were posted on fora and Facebook-pages with topics related to parenting. Letters referring to the online survey were posted in child-friendly neighbourhoods, e-mailed to parents via a primary school teacher, and directly given to parents at primary schools. Additionally, some of the researcher's acquaintances were asked to further spread the survey throughout their own social circles. The research's purpose and participation criteria were mentioned both in the online messages and letters.

Despite the efforts, the response rate was fairly low. Approximately 300 letters were posted in child-friendly neighbourhoods and directly given to parents at primary schools, online messages were posted on 29 fora and Facebook-pages, 11 primary schools were contacted to request cooperation and approximately 20 acquaintances forwarded the message offline. Only one primary school was willing to cooperate. Eventually, only 98 responses were obtained, of which 79 remained after discarding largely incomplete and blank surveys.

Given that participants for this study were partially approached online, it is likely that the sample is biased in terms of computer- access and skills. However, the online method was chosen because it is an effective way to obtain geographically heterogeneous samples (Rudestam & Newton, 2007), an aspect of great importance for this study. Moreover, participants appreciate the anonymity created by the impersonal format of an online survey over a face-to-face survey or an interview (Rudestam & Newton, 2007).

There was one criterion for participation: the participants had to have one or more child(ren) in the specified age range of 8 to 12 years. This age range was selected to cover the majority of children that likely fall into the target group of LTDs; children who are likely to play outdoors independently, but are probably not seen as fully autonomous or capable of

looking after themselves. Research validates that children aged between eight and eleven years old start playing independently in their neighbourhoods (Valentine & McKendrick, 1997). The cognitive and perceptual abilities of children at the age of ten (the median of the chosen age range) render it more likely that they have some independent mobility outdoors (Hillman et al., 1990; Jago et al., 2009, in Foster et al., 2014). Research confirms that there is a significant leap in children's spatial range around this age (Hart, 1978, in Valentine & McKendrick, 1997).

3.2.Participants

In total, 98 responses were obtained, of which nineteen had to be omitted, resulting in a final sample of 79 respondents. The sample consisted of 13 fathers (16.5 %) and 66 mothers (83.5 %) (Table1). The youngest father was 28 years old, the oldest was 61 years old, with a mean age of 43.58 (SD=9.64). The youngest mother was 21 years old, the oldest 49 years old, with a mean age of 38.58 (SD=5.30).

Prior to completing the survey, each parent was asked to take one child in mind in the age range of 8-12. The survey asked various questions regarding this child's characteristics. The ratio of sons and daughters was fifty-fifty, and around fifty-percent (N=44) of the children was 9 or 10 years old. The mean age of both sons and daughters was about equal, 9.58 (SD=1.20) and 9.85 (SD=1.31) respectively.

With regard to the gender composition of the parent-child dyads, slightly more fathers with a son participated compared to mothers with a son (Table 1). This in contrast to parents with a daughter; slightly more mothers participated compared to fathers (Table 1).

Table 1 Ratios regarding parents with a son or daughter (numbers, percentages between brackets)

	Parent		
	father	mother	total
Child			
son	8 (61.5%)	32 (48.5%)	40 (50.6%)
daughter	5 (38.5%)	34 (51.5%)	39 (49.4%)
total	13 (16.5%)	66 (83.5%)	79 (100%)

Parents were asked about their child's actual independent mobility outdoors and mobile phone ownership. About fifty-percent (N=40) of the children are allowed to play outside independently several times a day (Table 2). Of the girls, about 44 percent is allowed to play outside independently several times a day, whereas this is nearly 60 percent of the boys (Table 2). However, there is no significant association between the child's gender and frequency of independent outdoor play ($X(6) = 2.84$, $p = .83$). A small majority of the children do not own a mobile phone; about two-third of the boys do not own a mobile phone, whereas this is only about half of the girls (Table 2). There is, however, no significant association between the child's gender and mobile phone ownership ($X(1) = 2.16$, $p = .14$).

Table 2 Children's mobile phone ownership, older siblings and frequency of independent outdoor play (numbers, percentages between brackets)

	Child		
	sons	daughters	total
Mobile phone			
yes	13 (32.5%)	19 (48.7%)	32 (40.5%)
no	27 (67.5%)	20 (51.3%)	47 (59.5%)
Older siblings			
yes	23 (57.5%)	13 (33.3%)	36 (45.6%)
no	17 (42.5%)	26 (66.7%)	43 (54.4%)
Playing outdoors			
never	3 (7.5%)	3 (7.7%)	6 (7.6%)
once a month	2 (5.0%)	2 (5.1%)	4 (5.1%)
several times a month	2 (5.0%)	4 (10.3%)	6 (7.6%)
once a week	2 (5.0%)	1 (2.6%)	3 (3.8%)
several times a week	6 (15%)	8 (20.5%)	14 (17.7%)
once a day	2 (5.0%)	4 (10.3%)	6 (7.6%)
several times a day	23 (57.5%)	17 (43.6%)	40 (50.6%)

The majority of the participants were Dutch (86.1%). The distribution of parents living in urban or suburban/rural areas is relatively equal for both genders (Table 3). Most participants (81%) are either married or living together, this applies to both mothers and fathers. The majority (68.4%) indicates having a middle class income (Table 3).

Table 3 Characterization of the sample regarding nationality, marital status, income, and living environment (numbers, percentages between brackets)

	Parent		
	father	mother	total
Nationality			
Dutch	9 (69.2%)	59 (89.4 %)	68 (86.1%)
Flemish	4 (30.8%)	7 (10.6%)	11 (13.9%)
*Marital status			
single	2 (15.4%)	11 (16.7%)	13 (16.5%)
married/together	11 (84.6%)	53 (80.3%)	64 (81.0%)
Income class			
low	0 (0.0%)	9 (13.6%)	9 (11.4%)
middle	10 (76.9%)	44 (66.7%)	54 (68.4%)
high	3 (23.1%)	13 (19.7%)	16 (20.3%)
Living environment			
suburban/rural	7 (53.8%)	37 (56.1%)	44 (55.7%)
urban	6 (46.2%)	29 (43.9%)	35 (44.3%)

*The total number in the marital status box does not reflect the entire participant pool, as 2 participants indicated their marital status was different than the two given options

The majority of the Dutch parents either completed an (V)MBO - Vocational Education/Community College or an HBO education - University of Professional Education (78 %). Of the Dutch mothers this accounts for 79.7 percent, for the Dutch fathers it accounts for 66.6 percent.

The majority of the Flemish parents completed a university or higher education (72.7%). This accounts for about half of the Flemish mothers (57.1 %), and all of the participated fathers (N=4).

3.3.Measures

The survey consisted of an introductory page, 13 closed questions, and 20 statements, divided over 7 sections. The introductory page described the study's topic and the research purpose. Furthermore, parents were asked to only think of one child in the mentioned age range to

avoid ambiguity. In addition to the socio-demographic characteristics already discussed, the following constructs were measured.

3.3.1. Parental fear of strangers

An adjusted scale, containing 5 items, was used to measure parental fear of strangers. The scale was acquired from Foster et al.'s article (2014), in which the impact of parental fear of strangers on children's independent mobility was examined. The original scale consisted of three items, namely: *"How fearful are you that if your child walked or cycled in your neighbourhood without an adult he or she may : (1) be approached on the street by a stranger; (2) be taken by a stranger; and (3) be hurt by a stranger (Cronbach's alpha = 0.93)."* (Foster et. al., 2014, p. 62). Parents could respond on a five-point Likert scale (not at all fearful to extremely fearful).

In this study 5 items were used to measure parental fear of strangers (M=3.67, SD=1.37, $\alpha = .86$). The three aforementioned items were rewritten as follows: *"When my child goes outside alone, I am fearful that: (1) he or she will be addressed by a stranger; (2) a stranger will hurt him/her; and (3) he/she will be abducted".* From the same article, one item from a related scale, namely informal social control, was rewritten and added, reading *"I am confident that bystanders will come to the aid when my child would be bothered by a stranger".* A self-designed fifth item was added, reading "*In general, I am a concerned parent".* Parents could respond on a seven-point Likert scale (completely disagree to completely agree). Because this exploratory study aims to provide insight into parental beliefs regarding LTD technology for children, a seven-point Likert scale was chosen over a five-point Likert scale in order to allow for sufficient variation in the responses.

3.3.2. Parental beliefs regarding potential LTDs usage

Two self-designed scales were used to measure parental beliefs regarding (1): the possibility that an LTD increases their child's safety, and (2) the possibility that an LTD decreases their child's autonomy and independence. Examples of statements to measure the belief that an LTD can potentially increase a child's safety are: *"I would feel more at ease when my child would go outside with a Location Tracking Device"*, and *"When my child would be equipped with a Location Tracking Device, I would allow him/her to go outside alone more often".* Examples of statements used to measure the belief that an LTD can potentially decrease a child's autonomy and independence are: *"I am fearful that my child will change his/her behaviour when he/she is aware of the monitoring by means of the Location Tracking*

Device", and *"My child's independence will be hindered when he/she is continuously watched by means of a Location Tracking Device"*. Parents could respond on a seven-point Likert scale (completely disagree to completely agree).

A factor analysis of the total item set with oblique rotation was performed and yielded a solution with two clearly interpretable factors (Table 4); one factor regarding 'potential safety provision' (M=3.53, SD=1.50, α=.85), and one factor regarding 'potential autonomy decrease' (M=4.98, SD=1.25, α=.90). The first factor consisted of 8 items. The second factor consisted of 4 items.

Table 4 Factor analysis: parental beliefs regarding potential LTD usage

	Component	
	1	2
LTD decreases autonomy		
A Location tracking Device will threaten my child's privacy	-.809	
When my child would be equipped with a Location Tracking Device, I would allow him/her to go outside alone more often*	.792	
My child's independence will be hindered when he/she is continuously watched by means of a Location Tracking Device	-.787	
The continuous monitoring by means of a Location Tracking Device will negatively affect my child's social development	-.740	
Using a Location Tracking Device my child's freedom will diminish	-.729	
When my child would be equipped with a Location Tracking Device I will let him/her carry out independent activities at a younger age (like walking or cycling to school or getting a few groceries)*	.696	
A Location Tracking Device will increase my child's freedom*	.627	
I am fearful that my child will change his/her behaviour when he/she is aware of the monitoring by means of the Location Tracking Device	-.608	
LTD provides safety		
A Location Tracking Device will increase my child's safety outdoors		.860
When my child would be equipped with a Location Tracking Device I as parent would be able to intervene better and timely when something happens to my child/when something has happened to my child outdoors		.838
A Location tracking Device could protect my child from external dangers		.798
I would feel more at ease when my child would go outside with a Location Tracking Device	.388	.609
Eigenvalues	6.17	1.53
Percentage Explanatory Variance	51.5%	12.7%
Cronbachs Alpha	.90	.85
M (SD)	4.98 (1.25)	3.53 (1.50)

Items with an * were reversed before performing the analysis

3.3.3. Willingness to adopt

A self-designed scale containing 3 items was used to measure parental willingness to adopt an LTD (M=3.41, SD=1.91, α=.91). These items were: *"I am of the opinion that Location Tracking Device technology will provide opportunities for children"*, *"I am willing to try out a Location Tracking Device for my child"*, and *"If Location Tracking Devices would be available for children, I would probably purchase one for my child".* Parents could respond on a seven-point Likert scale (completely disagree to completely agree).

4. Results

4.1.Descriptive statistics

Prior to reporting the results of the tested hypotheses, some general findings will be discussed with regard to two of this study's central constructs, namely, parental fear of strangers and children's independent outdoor play.

4.1.1. Parental fear of strangers

With regard to parental fear of strangers, it was found that the parents in this study averaged neutral scores (M=3.67, SD=1.37). For children in general, no gender difference was found: mothers (M=3.70, SD=1.38) did not have a significantly higher fear of strangers compared to fathers (M=3.51, SD=1.34) (t(77) =-.46, p =.65). These findings leave the sixth hypothesis, that stated that mothers would have a stronger fear of strangers than fathers, unsupported.

Interestingly, fathers' mean scores differed significantly for sons and daughters (t(11) =-3.00, p =.01). They showed significantly higher fears with regards to daughters (M=4.60, SD=1.27) than to sons (M=2.83, SD=.88) (Table 5). There was no such difference in mothers' scores with regard to sons and daughters (t(64) =-.25, p =.81).

Parent living in suburban/rural areas (M=3.70, SD=1.35) did not have a significantly higher fear of strangers compared to parents living in urban areas (M=3.63, SD=1.41) (t(77) =.23, p =.82). A one-way ANOVA indicated that there was a significant difference between parents' fear of strangers in the three income classes (F (2, 76) =3.49, p =.04). A post hoc Tuckey test showed that there was a significant difference between the low (M=4.40, SD=1.14) and high (M=3.00, SD=1.33) income classes (p =.04) (Table 5). This difference also applied for mothers in particular (F(2, 63) =4.02, p =.02). A post hoc Tuckey test showed that mothers who assigned themselves to the low income class had a significantly higher fear of strangers (M=4.40, SD=1.14) compared to mothers who assigned themselves to the high income class (M=2.86, SD=1.23) (p =.03).

A bivariate correlation showed that there was no significant relation between children´s age and parents' fear of strangers (r= -.02, p =.86). Lastly, a bivariate correlation showed that there was also no significant relation between the parent's age and their fear of strangers (r =-.16, p =.15).

Table 5 Fear of strangers in relation with various socio-demographics (means, standard deviations between brackets)

	Fear of strangers		
	father	mother	total
	3.51 (1.34)	3.70 (1.38)	3.67 (1.37)
Child			
son	**2.83 (.88)***	3.66 (1.49)	3.49 (1.42)
daughter	**4.60 (1.27)***	3.74 (1.29)	3.85 (1.31)
Nationality			
Dutch	3.49 (1.51)	3.64 (1.38)	3.62 (1.38)
Flemish	3.55 (1.06)	4.20 (1.43)	3.96 (1.30)
Living environment			
suburban/rural	**2.83(1.04)***	3.86 (1.35)	3.70 (1.35)
urban	**4.30 (1.27)***	3.49 (1.42)	3.63 (1.41)
Marital status			
single parent	4.40 (1.98)	3.24 (1.39)	3.42 (1.46)
married/living together	3.35 (1.26)	3.78 (1.40)	3.71 (1.37)
Income class			
low	-	**4.40 (1.14)***	**4.40 (1.14)***
middle	3.48 (1.26)	3.80 (1.38)	3.74 (1.35)
high	3.60 (1.91)	**2.86 (1.23)***	**3.00 (1.33)***

Asterisks indicate a significant difference between the scores in the same column block.

4.1.2. Determinants of children's independent outdoor play

There was a significant negative correlation between fear of strangers and the frequency of children's independent outdoor play (r =-.30, p =.01): the stronger the parental fear of strangers, the more infrequent a child was allowed to play outdoors independently.

Furthermore, an independent samples T-test showed that there was a significant difference between children that did and did not own a mobile phone and their frequency of independent outdoor play (t(76.91) =3.64, p = .000). Children who owned a mobile phone (M=6.31, SD=1.47) were allowed to play outdoors independently significantly more often than children who did not own a mobile phone (M=4.85, SD=2.10).

An independent samples T-test also showed there was a significant difference between children who did and did not have older siblings and their frequency of independent outdoor play (t(76.83) =2.39, p =.02). Children who had older siblings (M=6.00, SD=1.69) were allowed to play outdoors independently significantly more often than children who did not have older siblings (M=4.98, SD=2.12).

4.2.Testing the hypotheses

4.2.1. Beliefs about LTDs as predictors of parental willingness to adopt an LTD

The first hypothesis stated that the parental belief that LTD technology provides children with safety would be negatively related to the parental belief that LTD technology negatively affects children's autonomy. A bivariate, two-tailed correlation showed that there was a significant negative correlation between the two variables (r =-.54, p =.000). This supports the first hypothesis (Figure 5).

The second hypothesis stated that the parental belief that LTDs negatively affect children's autonomy would be negatively related to parental willingness to adopt an LTD for their child. A bivariate, one-tailed correlation showed that there was indeed a significant negative correlation between the two variables (r =-.76, p =.000), supporting the second hypothesis (Figure 5).

The third hypothesis stated that the parental belief that LTDs potentially provide a child with safety would be positively related to parental willingness to adopt an LTD for their child. A bivariate, one-tailed correlation showed a significant positive correlation between the two variables (r =.76, p =.000), supporting the third hypothesis (Figure 5).

4.2.2. Fear of strangers in relation to parental beliefs about LTDs

Hypothesis 4a stated that parents with a stronger fear of strangers would have a stronger belief that LTD technology provides children with safety than parents with a weaker fear of strangers. A bivariate, two-tailed correlation showed that there was a significant positive correlation between the two variables (r =.38, p =.000). This supports hypothesis 4a (Figure 5).

Hypothesis 4b stated that parents with a weaker fear of strangers would have a stronger belief that LTD technology negatively affects children's autonomy than parents with a stronger fear of strangers. A bivariate, two-tailed correlation showed that there was a significant negative correlation between the two variables (r =-.44, p =.000). This supports hypothesis 4b (Figure 5).

4.2.3. Parent- child gender interactions in relation with parental beliefs regarding LTDs

To test the hypotheses concerning the parent-child gender interactions, two two-way ANOVAs were performed with one of the two beliefs regarding LTDs as the dependent variable, and the child's and parent's gender as independent variables (fixed factors).

The results of the first two-way ANOVA showed that there was no main effect of the child's gender ($F(1,75) = 3.43$, $p = .07$), nor of the parent's gender ($F(1,75) = .001$, $p = .97$) on the parental belief that LTDs decrease children's autonomy (Figure 3). These findings support hypothesis 5b and leave hypothesis 7b unsupported. Hypothesis 5a stated that parents of a son would have an equally strong belief that LTD technology negatively affects children's autonomy as parents of a daughter. Hypothesis 7b stated that fathers would have a stronger belief that LTD technology negatively affects children's autonomy compared to mothers. There was also no significant interaction effect between the parent's gender and the child's gender on the belief that LTDs decrease autonomy ($F(1, 75) = .09$, $p = .77$). This supports hypothesis 8b, which stated that both parents would have an equally strong belief that LTD technology negatively affects children's autonomy with regard to daughter(s) and son(s).

The results of the second two-way ANOVA showed that there was no main effect of the child's gender ($F(1,75) = .47$, $p = .50$), nor of the parent's gender ($F(1,75) = .62$, $p = .43$) on the parental belief that LTDs provide children with safety (Figure 4). These results support hypothesis 5a and leave hypothesis 7a unsupported. Hypothesis 5a stated that parents of a son would have an equally strong belief that LTD technology provides children with safety as parents of a daughter. Hypothesis 7a stated that mothers would have a stronger belief that LTD technology provides children with safety compared to fathers.

There was also no significant interaction effect between the parent's gender and the child's gender on the parental belief that LTDs provide children with safety ($F(1,75) = .74$, $p = .39$). This leaves hypothesis 8a unsupported, which stated that mothers, more so than fathers, would feel the belief that LTD technology provides children with safety more strongly for daughters than for sons.

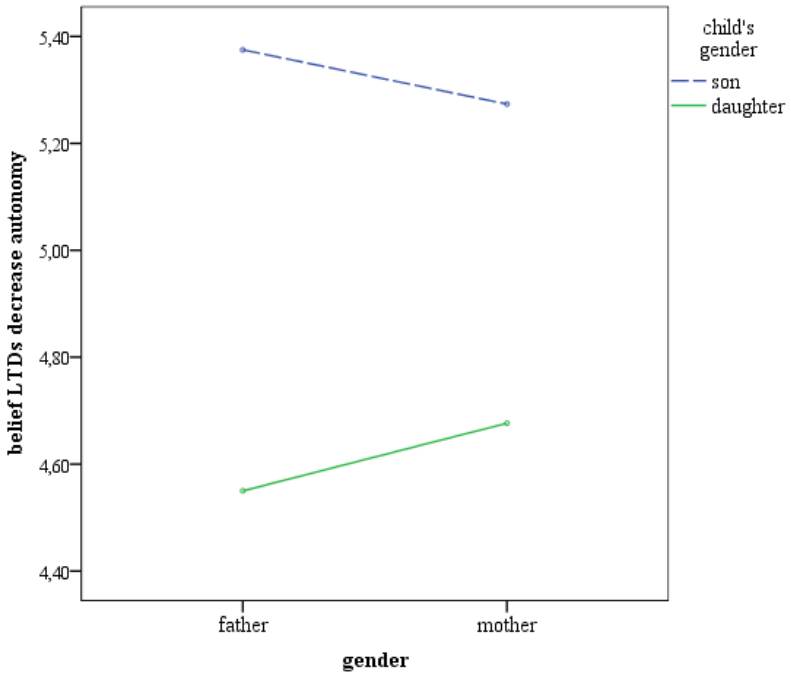

Figure 3 Parent-child gender interaction regarding the parental belief that LTDs decrease children's autonomy

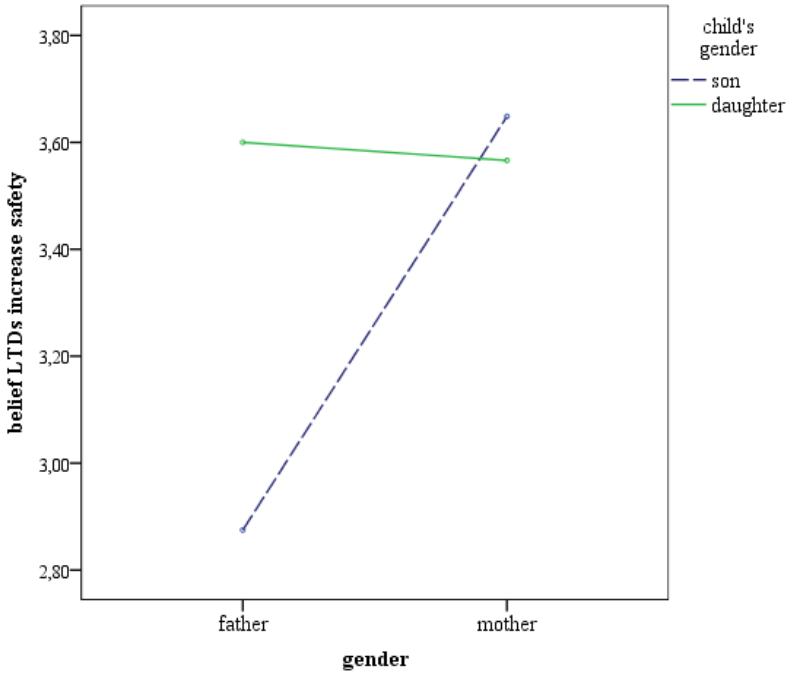

Figure 4 Parent-child gender interaction regarding the parental belief that LTDs provide children with safety

4.2.4. Socioeconomic status in relation with parental beliefs regarding LTDs.

Parents' SES was represented by multiplying the income and education level variables. Hypothesis 9a stated that parents with a lower socioeconomic status (SES) would have a stronger belief that LTD technology provides children with safety compared to parents with a higher SES. A bivariate, two-tailed correlation showed that there was a significant negative correlation between the two variables (r =-.29, p =.01). This supports hypothesis 9a (Figure 5).

Hypothesis 9b stated that parents with a higher SES would have a stronger belief that LTD technology negatively affects children's autonomy compared to parents with a lower SES. A bivariate, two-tailed correlation showed that there was no significant correlation between the two variables (r =.17, p =.13). This leaves hypothesis 9b unsupported.

4.2.5. Marital status in relation with parental beliefs regarding LTDs

Hypothesis 10a stated that single parents would have a stronger belief that LTD technology provides children with safety compared to couples that live together/are married. An independent samples T-test showed that there was no significant difference between single parents (M=3.33, SD=1.71) and married parents (or living together) (M=3.55, SD=1.48) with regard to their belief that LTDs provide children with safety (t(75)= -.49, p=.62). This leaves hypothesis 10a unsupported.

Hypothesis 10b stated that couples that live together/are married would have a stronger belief that LTD technology negatively affects children's autonomy than single parents. An independent samples T-test showed that there was also no significant difference between married parents (or living together) (M=4.95, SD=1.32) and single parents (M=5.10, SD=.99) with regard to their belief that LTDs potentially decrease children's autonomy (t(75) =.38, p =.70). This leaves hypothesis 10b unsupported.

4.2.6. Living environment in relation with parental beliefs regarding LTDs

Finally, hypothesis 11a stated that parents living in urban areas would have a stronger belief that LTD technology provides children with safety compared to parents living in suburban or rural areas. The result of an independent samples T-test showed that there was no significant difference between parents living in urban areas (M=3.36, SD=1.55) and parents living in suburban/rural areas (M=3.67, SD=1.46) and their belief that LTDs potentially provide children with safety (t(77)=.92, p=.36). This result leaves hypothesis 11a unsupported.

Hypothesis 11b stated that parents living in suburban or rural areas would have a stronger belief that LTD technology negatively affects children's autonomy compared to parents living in urban areas. The result of an independent samples T-test showed that there was also no significant difference between parents living in suburban or rural areas (M=4.91, SD=1.34) and parents living in urban areas (M=5.08, SD=1.15) and their belief that LTDs potentially decrease children's autonomy (t(77) =-.59, p =.56). This leaves hypothesis 11b unsupported.

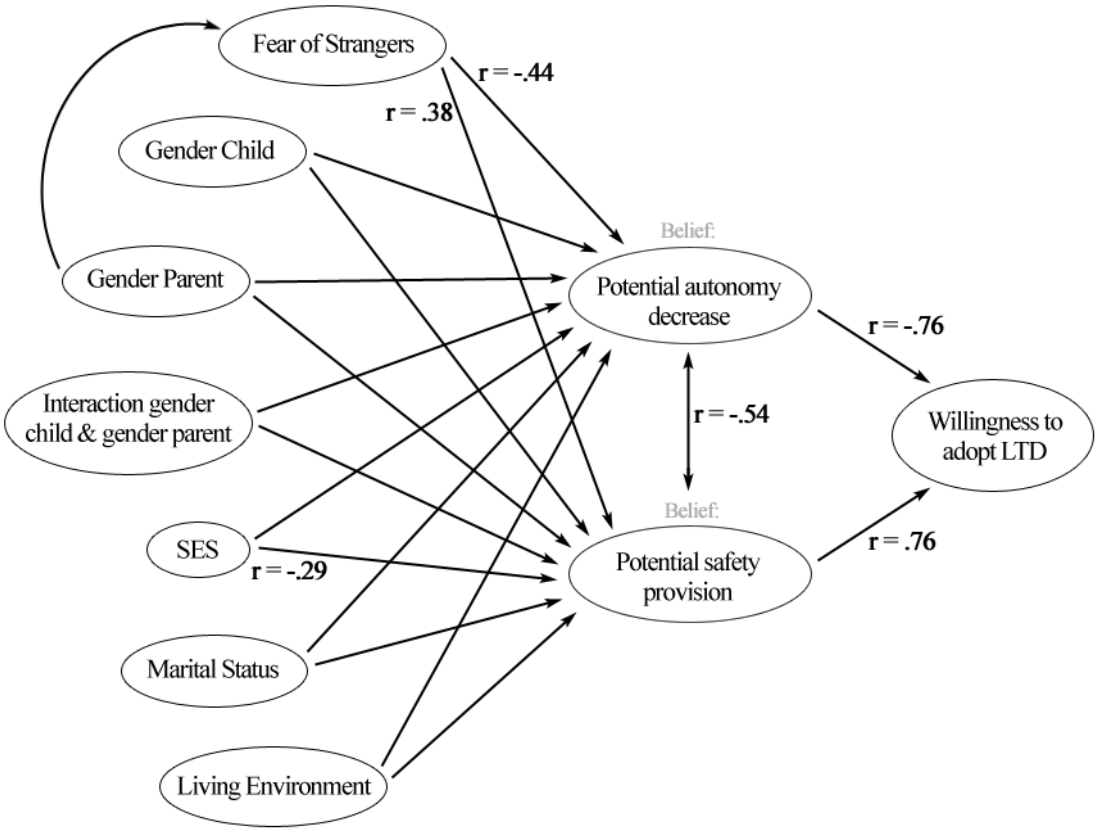

Figure 5 Significant correlations regarding socio-demographics, fear of strangers, parental beliefs and parental willingness to adopt an LTD for their child

5. Discussion

This study examined whether socio-demographic factors and parental fear of strangers were related to parental beliefs regarding the usefulness of Location Tracking Devices for children. The parental beliefs measured were: 1) the belief that LTDs potentially provide children with safety and 2) the belief that LTDs potentially negatively affect children's autonomy. Additionally, it was examined whether these beliefs influence parental willingness to adopt an LTD for their child.

5.1.Parental beliefs and willingness to adopt LTDs

As hypothesised, the two measured beliefs significantly influenced parental willingness to adopt an LTD for their child. The parental belief that LTDs provide children with safety was positively related to parental willingness to adopt an LTD. The belief that LTDs decrease children's autonomy was negatively related to parental willingness to adopt an LTD. As predicted, the two beliefs were negatively correlated. When a parent strongly supports one of the beliefs, he/she does not, or to a lesser extent, support the other belief. The assumption made on the basis of Davis' Technology Acceptance Model (1986 in Szajna, 1996), that the *perceived usefulness* of LTD technology would be the most influential determinant of parental beliefs towards using the LTD technology, is supported by this study. Parents' intention to acquire an LTD for their child is influenced by their beliefs, which are at least partially formed by the *perceived usefulness* of the LTD technology for children.

5.2.Factors influencing parental beliefs regarding LTDs

With regard to the factors that influence parental beliefs towards LTDs, it was found that parents with a higher fear of strangers had a significantly stronger belief that LTDs provide children with safety, whereas parents with a lower fear of strangers had a significantly stronger belief that LTDs negatively affect children's autonomy. The discovered effects of parental fear of strangers on parental beliefs support the idea that in our contemporary *world risk society* (Beck, 2002) parents are willing to rely on devices such as LTDs because the devices render a sense of control over their child's safety outdoors. Parents with a higher fear of strangers are more likely to equip their child with an LTD to monitor them. Parents are led to believe that with such devices their child's safety outdoors is better preserved. Equipping their child with an LTD will likely alleviate parental fears which may subsequently result in an increase in a child's independent mobility outdoors.

While they diminish parental fears, it remains to be seen whether LTDs truly enable children to more often play outdoors independently, thereby contributing to their mental and social development (i.a. Badland & Oliver, 2012, in Foster et al., 2014). Although these devices theoretically offer many advantages, the technology is currently not yet implemented for public use in the Netherlands. Future research may offer clarification concerning the actual usage of LTDs and their (proven) benefits for children's safety and independence outdoors.

Parents with a lower socioeconomic status (SES) had a significantly stronger belief that LTD technology provides children with safety. The results thus support the notion that the more resources and alternative play opportunities parents can offer their children, the less likely they are to rely on monitoring devices such as LTDs. Parents with a higher SES did not have a significantly stronger belief that LTD technology decreases children's autonomy. The assumption that parents with a higher SES would focus more on children's potential autonomy decrease, because these parents are more likely to have sufficient resources to supervise their children, is not supported by the results.

Interestingly, mothers did not experience a stronger fear of strangers in comparison to fathers, nor did they have a stronger belief that LTDs provide children with safety. The often found tendency for women to generally be more fearful and concerned than men (i.a. Hale,1996 in Foster et al., 2014; LaGrange & Ferraro, 1989 in Gustafson, 1998; Davidson & Freudenburg, 1996), is thus not supported by the results.

Furthermore, the assumption that parents are more concerned about daughters than sons, because girls are considered more vulnerable (i.a. Loyd, 1975, in Valentine & McKendrick, 1997), is also not supported by the results. This is consistent with Valentine and McKendirck's study (1997), which found that girls were generally seen as mature and sensible to recognize and avoid danger, whereas boys were seen as being more irrational and easily led by peers. These traits balance the difference in vulnerability between genders and explain why parents are equally worried about sons and daughters.

It is commonly assumed that sexual assault and abduction are more prevalent among girls than boys. If this were to be true, parents would experience a stronger fear of strangers with regard to their daughters and consequently have a stronger belief that LTD technology can provide them with added safety. In this study there were no such differences with regard to the child´s gender. This suggests that parents are of the opinion that boys and girls are equally at risk of being sexually abused or abducted. This assumption is supported by Valentine & McKendrick's (1997) study which found that the publicity given to sexual assault and murder of boys has increased parental anxieties about the safety of boys outdoors.

Marital status did not significantly influence parental beliefs regarding LTDs. Single parents were assumed to be more positive towards remote supervision of their children outdoors, as they are more likely to lack the proper means to do so continuously. A possible interpretation of the fact that marital status did not significantly influence parental beliefs may be that lacking the means to properly supervise a child, is more a characteristic of a parent´s SES, not of marital status. Being a single parent, does not necessarily mean being unable to properly supervise a child. A single parent can be just as observant as married couples and may have the same opportunities to let other people look after their child at times they cannot (e.g. bring their child to day-care when they are at work).

The lack of support for living environment as an influencing factor of parental beliefs may be due to the large variety within urban and suburban areas. While urban areas in general may be perceived as more dangerous due to the more chaotic and unpredictable nature of the environment, suburban areas are certainly not without their own threats. Possibly, it is perceived environmental risk, rather than the actual living environment, that is the dominant influencing factor of parental beliefs about LTDs.

5.3.Additional findings

Findings that are not specifically related to LTD technology, but relevant to the topic, were also included in the research. It was found that as parental fear of strangers increased, the frequency of the child's independent outdoor play decreased. This supports Valentine & McKendrick's study (1997) which states that parental anxiety is one of the most significant influences on whether children can play and act independently. It was also found that children who owned a mobile phone, were significantly more often allowed to play independently outdoors than children who did not own a mobile phone. This supports Pain et al.'s study (2005) which states that parents give their child a mobile phone to monitor them and to create a sense of security for both parties. Additionally, it was found that children who had older

siblings were also significantly more often allowed to play outdoors independently than children who did not have older siblings. This may be explained by parents' familiarization regarding children's upbringing. Once raising their first child(ren) proceeds without major difficulties, parents may be less anxious and more easy-going with regards to their younger children, allowing them to roam freely outdoors more often.

5.4.Parental self-efficacy

In this study only parents' SES and fear of strangers had a significant influence on (one of the) parental beliefs regarding LTDs. This suggests that parents' fears and available resources to supervise their children influence their perceptions of child-oriented aiding technology; in this case LTDs. Both factors revolve around a parent's capability to facilitate a child's needs while ensuring sufficient care and safety. Fear of strangers is related to potential external danger; these fears are likely based on parents' perceptions of how well they are able to protect their children from external threats (a higher experienced fear, however, does not necessarily indicate greater danger). SES is more related to internal concerns of whether parents are able to provide sufficient resources to support a child's needs. The other tested socio-demographic factors do not seem to have such a direct influence on a child's needs and safety. It seems plausible that a parent's self-efficacy when it comes to raising their child (rather than factual demographics), is the primary influencing factor of parental beliefs regarding child-aiding technologies and their willingness to adopt such technology. Future studies may provide insight in this assumption.

5.5.LTD technology for children related to Beck's 'world risk society'

If parents' self-efficacy would be the primary influencing factor of parental beliefs regarding certain technology, this may support Beck's (2002) notion of our contemporary *world risk society*. *Risk* reflects the reaction to uncertainty but also incorporates the concept of control (Beck, 2002; Beck, 2009). This inability-to-know can either be suppressed, or become the centre of attention (Beck, 2009). According to Beck's theory, parents´ fears concerning their child´s safety outdoors can thus be seen as a response to uncertainty, and parents will try to control any potential external danger. If the inability-to-know becomes the centre of their attention, parents will likely put more effort in trying to control the uncontrollable; their child's safety outdoors.

The dynamic of *world risk society* rests on the assumption that we live in a world that has to make decisions concerning its future under self-made insecurity (Beck, 2009). In other

words, we live in a society that generates its own insecurities and danger, assuming we can subsequently control and compensate for it (Beck, 2009). To explain this, Beck (Adam, 1998, 2002, in Beck 2002) gives the example of decisions made about nuclear energy and gene technology that are unleashing unpredictable and uncontrollable consequences.

While these examples are imposing and describe events on a much larger scale, the notion of *world risk society* may also be applicable to LTD technology for children. One could say that our modern day technological appliances and practises have made the outdoor environment more dangerous for children to independently play outdoors. For example, traffic has increased in density and some claim that nowadays children grow up faster due to things like early alcohol consumption, the internet, and mobile phone ownership (Boekblad, 2001; Retailnews, 2005). These practises likely result in children having more independence at an earlier age, which possibly entails increased levels of danger (e.g. children who are allowed more independence outdoors at an earlier age because they own a mobile phone, yet are unaware of the threats strangers can represent). Furthermore, while people used to know and be aware of the people that lived in their close environment, western societies have grown more densely populated and individualistic (Veenhoven, 1999). In short, while children are claimed to be independent at a younger age, the potential hazards in their direct environment may have increased.

In view of the *world risk society*, LTD technology for children can be seen as a reaction to our modern day society in which potential outdoor danger for children has increased due to more advanced technological appliances and practices. By using LTDs, parents try to control the uncontrollable (a child's safety outdoors). Because these devices offer a sense of control, parents who are susceptible to fears and concerns regarding their child's safety outdoors are more likely to be drawn to this type of monitoring technology.

5.6.Limitations

This study had a number of limitations that need to be addressed. First of all, the study's sample was small-sized. Despite the small sample, however, several of the relationships were nonetheless significant. Second, mothers were overrepresented (83.5%) in the sample, making it possible that the findings are not well-grounded. Third, two specific beliefs were measured, assuming that these were the key beliefs parents have regarding LTD technology. It is possible that there is a much larger array of beliefs that parents hold that influence their willingness to adopt an LTD for their child, which could interact with the beliefs researched in this study. Additionally, it is highly likely that parents in general are rather sceptical

regarding a new technology for children that is not yet fully developed or implemented in families' everyday lives. The ability to monitor children's whereabouts whenever and wherever is perpendicular to the idea that children should be able to play freely, regardless of what benefits such technology can have. Finally, as the technology is not yet fully developed or implemented, this study concerns parental beliefs and intentions rather than opinions and behaviour regarding LTDs. Beliefs and intentions may remain weak indicators of technology use.

6. Conclusion

This study examined whether certain socio-demographic factors and one psychological factor (fear of strangers) influence parental beliefs regarding the usefulness of Location Tracking Devices for children, and whether these beliefs influence parental willingness to adopt an LTD for their child. The results demonstrated that parents' fear of strangers and socioeconomic status were the only two significantly influencing factors on parental beliefs. In turn, parental beliefs were found to significantly influence parental willingness to adopt an LTD for their child. Based on these findings it is suggested that parents' perception of their ability to look after their child(ren) (rather than fixed demographics), is the primary determinant of parents' disposition towards LTDs for children. On the basis of Beck's notion of our contemporary *world risk society*, parental fears with regard to children's safety outdoors may cause parents to rely on child-oriented technological appliances such as LTDs, as they offer a sense of control over the uncontrollable risks their child is exposed to outdoors.

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