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Child Online Safety Intervention through Empowering Parents and Technical Experts: Indian Context

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Abstract. Child online safety is a state of being protected from online problematic content and environment. Purpose of this study is to examine the stakeholders' empowered status influence on child online safety. Using questionnaires survey responses on relational aspects of stakeholder empowerment and child online safety is collected from parents and technical experts who were working with the Internet safety. The responses are analyzed with the help of SPSS software and the results are examined for influencing factors of child online safety. Restricting resources, blocking at different levels and parental control are the different influencing factors of child online safety. As the parental control influencing factor exists with both the models of parents and technical experts initiated, it plays an important role in attaining child online safety. The influencing factors which are observed from the study can be emphasized to control child online threats and provide online safety.

Keywords: Child online safety, parents and technical experts' initiatives, India, online threats, influencing factors.

1 Introduction

In this digitized era, Internet is an essential part of life and its size is increasing with a greater number of household connections. Evolution of computers and popularity of Internet is allowing fast communication between people. World Wide Web, Peer to Peer Networks, Emails, instant messaging applications and Social networking sites are playing major role in information exchange (Thanuskodi, 2019).

Child online safety is a state of being protected from online problematic content and environment. Online Child Exploitation has been a concern across the globe. Safety is a major concern of the children who use Internet since it is a medium to access different types of information which could have positive and negative impacts on the children. Children are more victimized from exploitation than older person (Kristensen, 2003). Online child exploitation or allied risks comes into picture only when considering internet technologies as the use pattern. Though, the Internet technologies have contributed towards the improvements of social, scientific or economic arena, its adverse effects cannot be neglected. Understanding Internet technologies, its applications and allied vulnerable (virtual) world can be of paramount significance.

Acknowledging the dangers and hazards to children in the Internet depends on the blend of approaches which include self and co-regulatory, technical, legislative, educational awareness, not only positive content provision but also ensuring child safety zones. Every country has its own sets of policies to act against crimes related to child online safety. Different policy measures co-exist which address these risks and initiatives from different stakeholders which in turn create complex policies at national level and heterogeneous policies across different countries.

With these benefits and consequences of the Internet, this paper tries to identify different factors associated with child online safety and confirms some of the factors as influencers of child online safety. The current study involves testing of two different research models using the responses collected from parents and technical experts separately.

2 Theoretical Framework and Research Model

Increased growth of ICTs, high-speed connectivity and wider coverage of network made online activities easier and often harmful across the globe. In this digital era, the strong Internet governance practices are required to protect children's rights. The Internet governance organizations can incorporate multiple stake holders such as children, parents, teachers, Internet service providers, law enforcement agencies and governments for their better performance.

As the children online safety is a global issue, several countries have taken steps to act on it by introducing online child safety and protection related acts and various awareness programs (Livingstone and Smith, 2014; Isaac et al., 2004; ITU, 2015; UNICEF, 2012). In this regard, the guidelines are prepared for children, parents, caretakers, policy makers and industry by international research organizations (O'Connell 2003; ITU, 2015). The children online safety issues may be addressed within the categories such as governance, technology and social.

In this digitized era, attaining child online safety is a challenging task and demands a collective effort form the government, technical experts, parents and legal advisors. In the following subsections, the literature review is made on parents and technical experts-initiated child online safety.

2.1 Parents initiated child online safety

Digital Awareness. Awareness programs (NIST, 1998) are identified as the mechanism to build a secure positive environment by alerting users on consequences of Internet use. Safety awareness can be made through traditional media, websites, specialized awareness content from experts and Internet service providers. For the protection of young Internet users, emphasis on policies is needed to raise awareness and back appropriate measures (Livingstone et al., 2012).

Hp1: Digital awareness is an influencing factor for parents-initiated child online safety.

Establishing wanted contact. Avoiding unwanted contact can reduce risk of cyber solicitation and allied crime (Madigan et al., 2018). Before establishing a contact with others online, it is essential to understand their background.
Hp2: Establishing wanted contact is an influencing factor for parents-initiated child online safety.

Limited online convenience. Social networking sites enable users to share their updates such as the status, content of cognition and any specific behavior or action to friends (Jones et al., 2008). Self-disclosure of personal information and status updates may be problematic because of the risks like identity theft, cyber-stalking and cyber bullying. Users are more concerned about privacy but self-disclosure is prevalent (Jones et al., 2008). The online presence can be made with the availability of technology and usage convenience. With limited online convenience, the online risks can be reduced.
Hp3: Limited online convenience is an influencing factor for parents-initiated child online safety.

Online benefit. Children are spending more time with Internet and engaged in several online activities. The various concerns in this regard are cyber bullying, inappropriate content availability, addiction to Internet and issues of privacy (Livingstone et al., 2011). As the Internet is more personal and portable, it is hard to parents to monitor online activities of children (Shin, 2015). Since the inception of Internet, Internet addiction is identified as one among some of the most preoccupation (Burnay et al., 2015). The more online presence may attract both benefits and risks.
Hp4: Online benefit is an influencing factor for parents-initiated child online safety.

Restricting resources. Proliferation of Internet has significantly contributed to increased availability of pornographic or sexual content and changes in consumption of sexually explicit content by the children (Owens et al., 2012). It has enhanced the probability of children accidentally accessing such contents on the web. Restricting access to certain content and resources may reduce online risks.
Hp5: Restricting resources is an influencing factor for parents-initiated child online safety.

Educating on online risks. The online safety education is essential to reduce risks based on their usage pattern. The efforts on widely accepted preventive measures, awareness programmes and education are made by civil societies, industries, government initiatives and motivated individuals with a focus on online etiquette for children. The existing awareness programs for children are less appropriate to a system. System-wide awareness programmes needs to be implemented by accommodating in the high school and higher secondary curriculum. To provide training and workshops on online security, MEITY, a unit of the ministry of communications and information technology in India, has initiated a project on "information security education and awareness" for the duration 2015-2020 (ISEA, 2014). A certification programme in online security is also conducted for interested children by the centre for development of advanced computing under this project.

Hp6: Educating on online risks is an influencing factor for parents-initiated child online safety.

Empowering authorities. The national framework is a novel approach assigning responsibility to manpower to keep children safe. The framework establishes competencies and standards for people having direct/indirect contact with children to ensure that they are delivering a systematic and consistent standard of help to children and youngsters. A well-defined governance system for online grievance redressing with a mechanism to register online, investigate and respond within given time frame is developed. Empowering parents and concerned authorities may reduce online risks (Nawaila et al., 2018).
Hp7: Empowering authorities is an influencing factor for parents-initiated child online safety.

Parental control. Cyber bullying is an encapsulation of all forms of harms or harassments that commonly occur with Internet, computers and mobiles such as sending threatening, harassing and harmful mails or messages, posting derogative comments, intimidating online, ignoring, disrespecting, spreading rumors, stalking and physical threatening (Hinduja and Patchin, 2007). Therefore, identification of virtual harm may reduce the possibility of victimization. Video sharing sites are associated with age inappropriate content such as violent and pornographic content (Livingstone et al., 2013). Though, the parents are supportive to their children's Internet usage, setting limits on use, content types and time is a difficult task. Several tools are available to parents to limit the exposure of their children to age in-appropriate content. The parents can control online activities of their children to reduce online risks (McNally et al., 2018).
Hp8: Parental control is an influencing factor for parents-initiated child online safety.

2.2 Technical experts-initiated child online safety

Establishing wanted contact. Avoiding unwanted contact can reduce risk of cyber solicitation and allied crime (Madigan et al., 2018). Before establishing a contact with others online, it is essential to understand their background.
HT1: Establishing wanted contact is an influencing factor for technical experts-initiated child online safety.

Content filtering. Predators provoke children to participate in online sexual activities and broach the process through discussions on sexual nature by sending pornographic content based on the interest of children using chat rooms (Normand and Sallafranque-St-Louis, 2016). Websites or applications with chatting blogs have been identified as sites with greater prevalence. By using content filtering strategy online risks can be reduced.
HT2: Content filtering is an influencing factor for technical experts-initiated child online safety.

Blocking at different levels. The mobile applications can be blocked at different levels for the safety of children (McNally et al., 2018). Similarly, the online content can be monitored and blocked at different levels over the Internet (Gosh et al., 2018; DeMarco et al., 2018).
HT3: Blocking at different levels is an influencing factor for technical experts-initiated child online safety.

Education on online behavior. Young Internet users should have the capability to identify online social networking fake account, sexual content and connection request from multiple accounts of same person (Boshmaf et al., 2011). Knowledge on the activity that children are performing online is important. Users accept friend requests to connect by unknown when there exist mutual friends (Boshmaf et al., 2011). Identification of strangers in the social networking profile and removing them from the friend list is essential to reduce online risks. Often, a password sharing among family members is a common practice.
HT4: Education on online behaviour is an influencing factor for technical experts-initiated child online safety.

Identification systems. Parents and teachers may supervise children's activities at home and school. Often, the limited knowledge of parents to monitor children's activities online may lead to miss experiences of the victim and checking of predator actions. Identification of illegal content sources is important to control child online risks (DeMarco et al., 2018).
HT5: Identification systems is an influencing factor for technical experts-initiated child online safety.

ISP level effort. At the ISPs, the harmful content which originates from particular IP addresses can be blocked (Brennan et al., 2019). The blocking at ISP is a prevalent concept to mitigate risks.
HT6: ISP level effort is an influencing factor for technical experts-initiated child online safety.

Parental control. Though, the parents are supportive to their children's Internet usage, setting limits on use, content types and time is a difficult task. Several tools are available to parents to limit the exposure of their children to age in-appropriate content. The parents can control online activities of their children to reduce online risks (McNally et al., 2018).
HT7: Parental control is an influencing factor for technical experts-initiated child online safety

2.3 Research Model

Different variables related to child online safety are identified from literature review. The research model for parents-initiated child online safety is shown in Fig. 1. Digital awareness, establishing wanted contact, limited online convenience, online benefits, restricting resources, educating on online risks, empowering authorities and parental

control are the different independent variables in the parent-initiated child online safety. Similarly, a research model for technical experts-initiated child online safety is shown in Fig. 2. The different independent variables in technical experts-initiated child online safety are establishing wanted contact, content filtering, blocking at different levels, education on online behavior, identification systems, ISP level efforts and parental control.

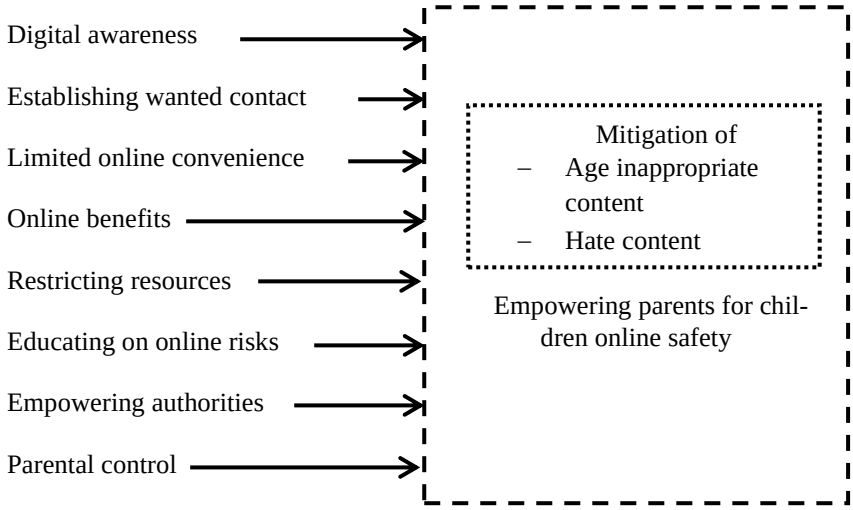

Fig. 1. Research model for parents-initiated child online safety

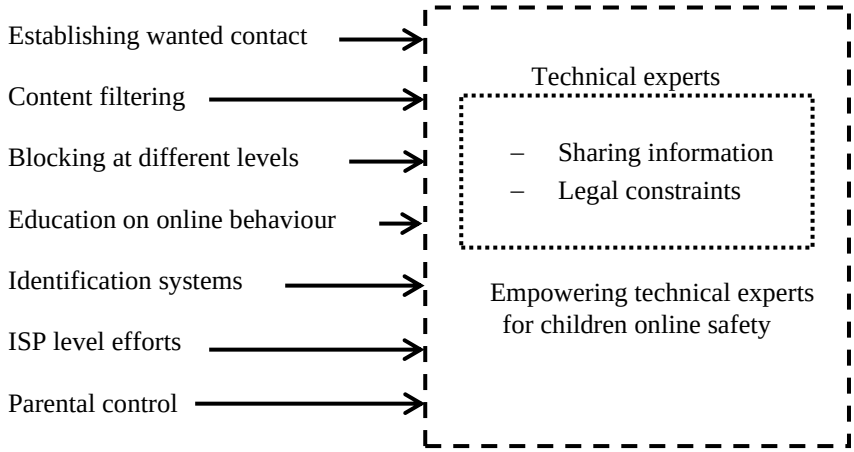

Fig. 2. Research model for technical experts-initiated child online safety

3 Methodology

The study uses a quantitative approach to determine the influence of online children safety. The data is collected through both online and offline modes by preparing questionnaires and requesting the different stakeholders who involved in Internet safety initiatives. The prepared questionnaire is shared through Google forms to identified parents and experts by considering references from various incidents related to child online safety. To collect responses from the aforesaid stakeholders a convenient cum random sampling approach has been considered. The stakeholders have been requested through online media such as Skype, WhatsApp Video call and in person to assess respective concerns toward escalating cybercrime, online child exploitation, leaking of personal information and allied incidents.

Two different structured questionnaires have been constructed and administered to a sample of parents and technical experts belonging to different age groups and exposed to Internet safety incidents. The questionnaires are designed to retrieve significant information from the respondents pertaining to their respective views and perception towards online child exploitation and various mechanisms and parental control techniques involved to prevent online child abuse.

After collecting the data, both online and offline data are integrated to construct a dataset for research. The combined dataset is processed and analyzed using SPSS software. The outcome of the regression algorithm is interpreted and influencers of child online safety are identified.

4 Results and Discussion

The results obtained from two different models such as parents initiated and technical experts initiated on online children safety are represented in the following subsections.

4.1 Parent initiated online children safety

The Pearson's correlation between the different influencers of parent initiated online children safety along with the significant levels is shown in Table 1. The correlation between the child online safety (COS) dependent variable and restricting resources (RR) independent variable is 0.59 and is larger positive value than the other variables. This correlations result will also serve as a mechanism for identifying multicollinearity among the influencers. As all the pairwise correlation values are below 0.9, there is no multicollinearity between the influencers (Field, 2009).

The result of regression analysis for parent initiated online children safety is shown in Table 2. R2 is a measure to know the variability resulting in dependent variable from independent variables. The model which is designed for predicting the parent initiated online children safety results 0.50 as R2 value. The effect size of the influencers on outcome variable is more. The F-Ratio for this model is 8.25 at highly significant level ($p<0.001$). The F-Ratio represents the prediction ability of the model. The effect size R2 and F represents overall performance of the model, i.e. the combined performance of all the influencers. The collinearity among variables can be checked with

variance inflation factor (VIF). As the VIF value of all measuring variables is less than 3, there is no collinearity among the variables. By referring to β values, the performance of individual predictor parameters can be measured.

Table 1 Correlation among different variables for parent-initiated model

	COS	DA	EWC	LOC	OB	RR	EOR	EA	PC
COS	1.00								
DA	0.30**	1.00							
EWC	0.46***	0.24*	1.00						
LOC	0.33**	0.23*	0.27*	1.00					
OB	0.26*	0.30**	0.34**	0.37***	1.00				
RR	0.59***	0.27*	0.51***	0.17	0.43***	1.00			
EOR	0.46***	0.24*	0.41***	0.32**	0.43***	0.56***	1.00		
EA	0.36**	0.17	0.38***	0.23*	0.34**	0.41***	0.30**	1.00	
PC	0.58***	0.09	0.52***	0.27*	0.21*	0.58***	0.45***	0.44***	1.00

**p < 0.05; **p< 0.01; ***p<0.001; COS: Child online safety; DA: Digital awareness; EWC: Establishing wanted contact; LOC: Limited online convenience; OB: Online behaviour; RR: Restricting resources; EOR: Educating on online risks; EA: Empowering authorities; PC: parental control.*

From Table 2, a path from digital awareness to parent-initiated child online safety is not significant as its P value is greater than 0.05. Therefore, the hypothesis Hp1 is rejected. Similarly, paths from establishing wanted contact, limited online convenience, online benefits, educating on online risks and empowering authorities to parent initiated child online safety are not significant as their P values are greater than 0.05. Therefore, the hypotheses Hp2, Hp3, Hp4, Hp6 and Hp7 are not accepted.

Table 2 Regression analysis result of parent-initiated model

Dept. Variable	R^2	F	Ind. Variable	Beta	T	VIF
Parent	0.50	8.25	Digital awareness (DA)	0.15	1.56	1.18
			Establishing wanted contact (EWC)	0.07	0.62	1.63
			Limited online convenience (LOC)	0.15	1.51	1.30
			Online benefits (OB)	-0.10	-0.93	1.55
			Restricting resources (RR)	**0.31**	**2.45***	**2.14**
			Educating on online risks (EOR)	0.08	0.74	1.67
			Empowering authorities (EA)	0.04	0.34	1.38
			Parental control (PC)	**0.28**	**2.33***	**1.94**

**p < 0.05*

The path form restricting resources to parent-initiated child online safety is significant as its P value is smaller the 0.05. This significance level made to accept the hypothesis Hp5. Hence, restricting resources is an influencing factor for parent-initiated child online safety. Similarly, the path from parental control to parent-initiated child online safety is also significant as its P value is smaller than the 0.05. Therefore, the

hypothesis Hp8 is also accepted. Hence, parental control is an influencing factor for parent-initiated child online safety.

4.2 Technical experts initiated online children safety

The Pearson's correlation between the different variables of parent initiated online children safety along with the significant levels is shown in Table 3. The correlation between the identification systems and ISP level efforts is 0.65 and more than the other correlations. The regression analysis for technical experts initiated online children safety is shown in Table 4. As R2 is a measure to know variability, the model provides 0.63 as R2 value and results in large effect size of the influencers on outcome variable. F-Ratio with the value 5.36 represents prediction ability of the model at highly significant level ($p<0.001$). There is no collinearity among variables as the VIF value of all measuring variables is less than 3.

Table 3 Correlation among variables for technical experts-initiated model

	COS	EWC	CF	BDL	EOB	IS	ISPE	PC
COS	1.00							
EWC	0.33*	1.00						
CF	0.03	0.40*	1.00					
BDL	-0.19	0.31*	0.50**	1.00				
EOB	0.20	0.38*	0.23	0.38*	1.00			
IS	0.32*	0.47**	0.31*	0.57**	0.38*	1.00		
ISPE	0.16	0.50**	0.16	0.49**	0.45**	0.65***	1.00	
PC	0.59**	0.35*	0.38*	0.30	0.23	0.51**	0.43**	1.00

**p < 0.05; **p< 0.01; ***p<0.001; COS: Child online safety; EWC:* establishing wanted contact; CF: Content filtering; BDL: Blocking at different levels; EOB: Educating on online behavior; IS: Identification systems; ISPE: ISP level efforts; PC: Parental control.

Table 4 Regression analysis result of technical experts-initiated model

Dept. Variable	R^2	F	Ind. Variable	Beta	T	VIF
Technical Experts	0.63	5.36	Establishing wanted contact (EWC)	0.23	1.37	1.67
			Content filtering (CF)	-0.15	-0.86	1.78
			Blocking at different levels (BDL)	**-0.50**	**-2.72***	**2.04**
			Education on online behaviour (EOB)	0.19	1.23	1.36
			Identification systems (IS)	0.30	1.54	2.29
			ISP level efforts (ISPE)	-0.23	-1.15	2.29
			Parental control (PC)	**0.62**	**3.84****	**1.55**

**p < 0.05; **p < 0.01*

A path from establishing wanted contacts to technical experts-initiated child online safety have P value more than 0.05 and is not significant. Therefore, the hypothesis

HT1 is rejected. Similarly, paths from content filtering, education on online behavior, identification systems and ISP level efforts to technical experts-initiated child online safety are not significant as their P values are more than 0.05. Therefore, the hypotheses HT2, HT4, HT5 and HT6 are not accepted.

The path form blocking at different levels to technical experts-initiated child online safety is significant as its P value is less than the 0.05. Hence, the hypothesis HT3 is accepted and interpreted as blocking at different levels is an influencing factor for technical experts-initiated child online safety. Similarly, the path from parental control to technical experts-initiated child online safety is more significant as its P value is lesser than the 0.01. Therefore, the hypothesis HT7 is also accepted. Hence, parental control is also an influencing factor for technical experts-initiated child online safety. The set of determinants of contributors to child online safety are shown in Figure 3.

The analysis shows that restricting resources influences child online safety. This indicates that facilitating children with limited resources such as Internet connection, Internet speed and connecting devices for online activities results in less online presence, which in turn may result in reduced exposure to online threats. Restricting web sites is also a part of restricting resources.

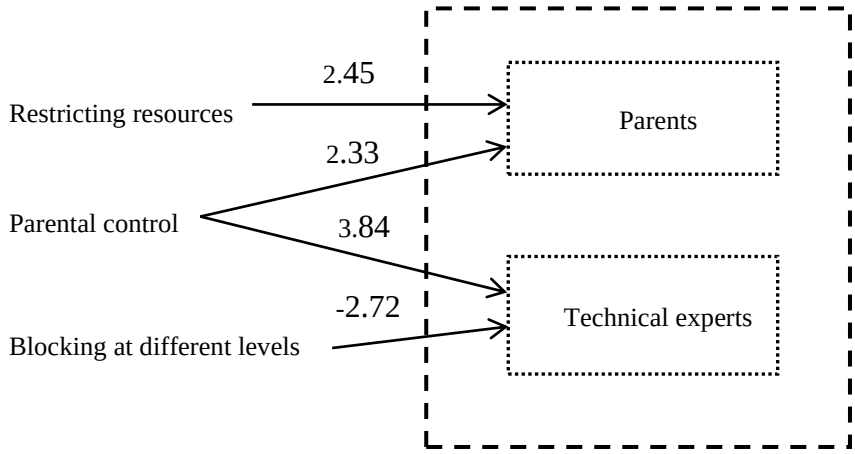

Fig. 3. Determinants of contributors to child online safety

Parental control variable is influencing both parents and technical experts-initiated child online safety models. Therefore, the control of children online activities by the parents plays an important role in attaining child online safety. This can be performed by maintain log records of online activities, installing supporting software and permitting the download of only genuine applications. Blocking at different levels is also an influencer of child online safety. This indicates that blocking some unwanted information at different levels, which may include blocking through the apps on the device to blocking at ISP.

5 Conclusion

Different dependent and independent variables are identified through the literature review. Based on these identified variables, the different hypotheses on prediction of parent and technical experts-initiated child online safety have been set. After collecting the responses using questionnaires, the data is analyzed with SPSS software package.

The analysis is made separately for two different models such as parents and technical experts-initiated child online safety. Parents initiated child online safety model identified two independent variables such as restricting resources and parental control as influencers of child online safety. Similarly, the technical experts-initiated child online safety model identified blocking at different levels and parental control as the influencers of the child online safety.

Even with the activeness of different international bodies to control online threats to children and attain child online safety, children are becoming online victims. Therefore, by emphasizing on the identified influencers the security measures can be improved to attain child online safety. As the parental control is observed form both the models, it can be strengthened by providing necessary assistance to parents for controlling the online activities of their children.

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