Investigating factors associated with mother-daughter communication intentions about STD risks and condom use behaviour of female college students

Leslie Ramos Salazar*

Business Communication & Decision Management,
Engler College of Business,
West Texas A&M University,
Canyon, Texas 79016, USA
Email: lsalazar@wtamu.edu
*Corresponding author

Priyanka Khandelwal

Business Communication & Marketing,
Engler College of Business,
West Texas A&M University,
Canyon, Texas 79016, USA
Email: pkhandelwal@wtamu.edu

Yvette Castillo

Education and Psychology,
West Texas A&M University,
Canyon, Texas 79016, USA
Email: ycastillo@wtamu.edu

Abstract: Mothers play a significant role in influencing and educating their daughters about safe sexual practices. Given that college students are a high-risk population for contracting Sexually Transmitted Diseases (STDs) this study investigated the concepts of the Risk Perception Attitude (RPA) framework and their associations to help understand mothers' communication intentions and efficacy to communicating with their young adult daughters about STD risks and condom use. More specifically, this study investigated the relationships between mothers' perceived risk (severity and susceptibility) of their daughters contracting an STD, and how their self-efficacy was associated with mothers' intentions of communicating with their daughters about condom use to prevent STDs. This study found evidence that mothers' self-efficacy (over perceived daughter risks) had the highest association with mothers' communicative intentions and efficacy to communicate to daughters to prevent STDs. The study also discusses ideas for future mother-daughter sexual risk communication research to prevent STDs in college women.

Keywords: mother-daughter communication; risk perception attitude; sexually transmitted diseases; college women and health.

Reference to this paper should be made as follows: Ramos Salazar, L., Khandelwal, P. and Castillo, Y. (2021) 'Investigating factors associated with mother-daughter communication intentions about STD risks and condom use behaviour of female college students', *Int. J. Behavioural and Healthcare Research*, Vol. 7, No. 3, pp.209–226.

Biographical notes: Leslie Ramos Salazar received her PhD degree from Arizona State University. She is an Associate and Abdullat Professor of Business Communication and Decision Management at the Paul and Virginia Engler College of Business at West Texas A&M University. Her teaching areas include current issues in management communication such as leadership communication and risk communication management, health care communication, business communication for health care managers, business communication and statistics for business and economics. Her research specialises in health communication, business communication, conflict management and interpersonal communication. Her publications appear in *Health Communication, Communication Teacher, Communication Quarterly, Communication Studies, and Business and Professional Communication Quarterly*.

Priyanka Khandelwal received her PhD degree from Texas Tech University. She is a Visiting Assistant Professor of Business Communication and Marketing at the Paul and Virginia Engler College of Business, West Texas A&M University. She has always been Intrigued by Social Media and the ways in which it can be used not only as a subject of research but also as a tool for conducting research in health communication and administration, social media marketing, identity construction and decision sciences.

Yvette Castillo received her PhD degree from Texas A&M University-Corpus Christi. She is an Associate Professor of Counsellor Education at West Texas A&M University and was the First Helen Piehl Professor of Education from the College of Education and Social Sciences. She is the Chair of the Counsellor Education Mental Health Graduate Program of Study and her teaching areas include cross-cultural counselling, human growth and development, psychopharmacology and counselling techniques with children and adolescents to list a few. Her research interests include social justice advocacy, servant leadership development, and issues of chronic illness, mental health stigma and infertility within couples.

1 Introduction

1.1 Background information

Risky sexual behaviours such as practicing sex without a condom can place young adults in college at a high risk of contracting Sexually Transmitted Diseases (STDs). STDs refer to sexually transmitted diseases such as syphilis, gonorrhoea, chlamydia, HPV, herpes, HIV, etc. About 19 million new STD infections occur every year, and more than half occur in young adults aged between 15 years and 24 years (Weinstock et al., 2004). The Centers of Disease and Control caution that young adults in this age group have an increased risk of getting STDs (e.g., gonorrhea) and also spreading it widely to others in college environments (CDC and Prevention, 2009). Roughly, about 1.7 million adolescents and young adults aged between 10 years and 19 years live with HIV

worldwide (Unicef, 2020). Likewise, in 2010, one in four new HIV infections were reported by young adults between 13 years and 24 years of age (CDC and Prevention, 2009). In particular, 86% of young women infected with HIV obtained it through unprotected heterosexual sex during their schooling years (CDC and Prevention, 2009). The increasing rates of sexual infection in college-aged adults is still an important health concern given that only about 1 out of 3 people report using condoms effectively to prevent infections despite the numerous efforts from the sexual education campaigns and interventions (American College Health Association, 2009). Given the prevalence of STDs in college campuses and the unsuccessful attempts of reducing STDs in young adults, the study of STDs in college students is still significant.

2 Literature review

2.1 Mother-daughter communication and sexual risk communication

Parents often play a critical role in influencing their adult children to reduce sexual risks through effective communication. For instance, parent-adolescent communication has found that communicating about sex is associated with a reduction of risky sexual behaviour such as having unprotected sex and practicing abstinence (DiClemente et al., 2001; Dittus et al., 1999; Dutra et al., 1999; Karofsky et al. 2000). It often leads to increased STD prevention strategies such as condom use (Miller et al., 1998). However, quality parent-adolescent communication may depend on the value adult children place on their parental relationships, which can influence their safe sex behavioural practices (Gilligan, 1982).

One major influence of college-aged women is their mothers. Mother-daughter communication refers to mothers' communicating to their daughters verbally about any wellbeing matters such as sexuality and STD prevention (McKay et al., 2000). Because mother-daughter relationships tend to be close, intimate, and well bonded, closeness tends to nurture open communication patterns about risky sexual behaviours (Donenberg et al., 2011). Daughters report more comfort in communicating about their sexual risky behaviours with mothers who take the responsibility to discuss these sensitive topics frequently versus mothers who avoid talking about risky behaviours to their daughters (Donenberg et al., 2011; Pistella and Botani, 1998). Mothers who discuss risky topics such as abstinence, condom use, rape prevention, and contraception techniques tend to develop their daughter's confidence in dealing with sexual negotiation and partner communication about safe sex (DiIorio et al., 1999; Lefkowitz et al., 2004).

Mothers are also more likely to obtain sexual health messages than fathers do about the risks of their daughters in college. Thus, mothers, have more safe sex knowledge and higher quality communication skills, and may communicate their risk concerns to their daughters more effectively as compared to fathers and peers at school (McKay et al., 2000; DiIorio et al., 1999). Consequently, communication between the mother-daughter relationship is important to promote safe sex practices such as condom use to prevent STDs.

2.2 The risk perception attitude (RPA) framework

The Risk Perception Attitude (RPA) framework hypothesises that self-efficacy moderates the effect of perceived risks on individual behaviour (Rimal and Real, 2003). RPA is relevant to interpersonal communication because its focus is on individual perceptions and behaviours and helps to understand how one individual's self-efficacy, response-efficacy, and behavioural intention may influence the behaviour of another person (Rimal and Real, 2003). This framework has been effectively used to predict protective health behaviours to prevent a variety of risks (Real, 2008; Rimal and Juon, 2010; Wong, 2009) and behavioural intentions (Rimal et al., 2009).

The RPA framework consists of individuals' perception of risk, which is a product of perceived susceptibility and severity (Rimal and Real, 2003). Perceived susceptibility is the belief of being more likely to be vulnerable to a threat, or risk (e.g., STD) (Rimal and Real, 2003), perceived severity refers to the extent of harmfulness of the consequences of the threat, or risk (e.g., STD) (Rimal and Real, 2003). Perceived susceptibility and severity are known to increase the motivation to engage in preventative actions (e.g., condom use to prevent STDs) (Rimal et al., 1999). When susceptibility and severity of getting an STD are high, individuals are more likely to become self-efficacious to promote condom use as a preventative behaviour than individuals who perceive low susceptibility and severity of getting an STD (Rimal et al., 1999). The RPA framework is useful in understanding the communication process of encouraging condom use behaviour to prevent STDs in college students because it predicts that self-efficacious mothers who perceive that their daughters may be at risk of getting an STD may be moved to communicate with their daughters about using a condom to prevent STD infections.

RPA's perceived risk to others (versus self) has been examined with other STD health issues such as the HPV vaccine (Krieger et al., 2011). Perceived threat to others can motivate behaviour change to reduce threat to another person (Krieger et al., 2011; Roberto and Goodall, 2009). Therefore, this paper seeks to extend these findings to STDs and preventative condom use behaviour by examining mothers' perceived risks of their daughters.

2.3 Relationships between Mothers' Risk, Self-Efficacy, Response-Efficacy, and Intentions

Mothers' perceived risks are associated with behavioural intentions that lead to response efficacy behaviours. Previous studies have found that individuals' perceived risks of becoming infected of HIV/AIDS were associated with the intention to reduce risky sexual behaviours (Jemmott et al., 1992). Also, young adult women who report feeling susceptible to getting an STD infection were more likely to reduce their susceptibility by communicating concerns to their mothers and increasing self-protective health behaviours (Askelson et al., 2012; McCaul and Mullens, 2003). The predictors of sexual intention include the risk perceptions of young adults who have numerous sexual partners, which place young adults at a greater risk (Buunk et al., 1998). Parents' perceived risks are shown to be associated with parents' intentions to communicate to their daughters about preventative sexual behaviours (e.g., condom use) to reduce high-risk sexual behaviour (DiIorio et al., 2003; Whaley, 1999). Studies have also revealed that mother-daughter sexual risk communication is negatively associated with episodes

of unprotective sexual intercourse intentions (Hutchinson et al., 2003). Thus, perceived risks have an impact on behavioural intentions.

Mothers' intentions of communicating about sexual topics to their daughters may depend on their own perceived self-efficacy behaviours. For instance, parent-child communication studies have shown that perceived efficacy be associated with communicating about condom use. Parent initiated communication is a critical first step in increasing safe sexual behaviours of their daughters (Jemmott et al., 1992). Similarly, intentions of communicating about STD risks are associated with self-efficacy. Mothers with high self-efficacy tend to have intentions to talk about condom use during sexual intercourse to their adult children (Jemmott et al., 1992). On the other hand, mothers' with low self-efficacy who report feeling less confident in communicating with their daughters about sexual intercourse report being uncomfortable reaching out to their daughters and also less likely to discuss sensitive topics related to sexual behaviour (Guilamo-Ramos and Dittus, 2008). Parents who are comfortable talking about sexual risks demonstrate their parental values regarding contraceptive and condom use values, which is linked to delayed intercourse among their adolescent children (Parkes et al., 2011). Parent-adolescent communication has also reduced sexual risks of young adult women who initially thought they were not at risk prior to discussing the sexual risks with their parents (Hutchinson, 2006). For example, if a mother intends to communicate about STD risks, then mothers may be more likely to be effective at reducing their children's STD risks.

Mothers' self-efficacy has been shown to be associated to response-efficacy, which may lead to preventative health behaviours (Krieger et al., 2009; Lefkowitz and Espinosa-Hernandez, 2007). Prior interventions have attempted to reduce STD and HIV incidents of young women by educating parents about the risks and to increase their self-efficacy, but most interventions were not effective (Robin et al., 2004). Parents who receive educational messages of STD prevention are more likely to feel efficacious about talking to their children about sexual behaviours and STD prevention (Hutchinson, 2002; Whitaker et al., 1999). Parents with self-efficacy tend to communicate to their adult children with greater frequency and breadth of topics (Martino et al., 2008). More specifically, mothers with self-efficacy and response-efficacy report intending to help daughters reduce STD risks by vaccinating them against the human papillomavirus, which is one of the most common STD infections (Kahn et al., 2009). When daughters perceived that their mothers approved of risk reduction techniques, daughters reported wanting to reduce STD risks by vaccinating against HPV and communicating to their partners about condom use (Garcia-Retamero and Cokely, 2011; Roberts et al., 2010).

Mother-daughter communication is an effective strategy to promote condom use in young adults. Communicating about condom use response-efficacy has been shown to be an effective means of preventing STDs, and several intervention programs have been designed to get parents to talk to their children in order to promote condom use skills (Pequegnat and Szapocznik, 2000). Condom use response-efficacy has also been linked to behavioural intentions of condom use, which tend to reduce risky behaviours (Hutchingson et al., 2003). Thus, if mothers' intention leads to communication about the importance of condom use and the risks of STD in a college environment, then this may influence daughters' risk reduction behaviours by choosing to use condoms subsequently (Brown et al., 1997; Cederbaum et al., 2012; Fox and Inazu, 1980; Whitaker and Miller, 2000).

Parent-adolescent communication literature highlights the self-efficacy of parents to communicate a message within a channel to the recipient (the young adult) in a broad context based on behavioural intentions and response efficacy (Jaccard et al., 2002). This maternal model is one way to understand how a mother's risk and self-efficacy can influence a mother's intention and response-efficacy, which can influence mothers' intentions to communicate. Based on the previous literature and the relationship between the hypothesised constructs of the RPA framework, the following hypotheses have been posed.

H1: Mothers' risk (severity and susceptibility) will be positively associated with mothers' intentions to communicate to their daughters about condom use.

H2: Mothers' efficacy beliefs will be positively associated with mother's intentions to communicate to their daughters about condom use.

H3: Mothers' behavioural intention will be positively associated with mother-daughter talk efficacy about STD risks.

H4: Mothers' behavioural intention will be positively associated with mother-daughter talk response efficacy about condom use.

H5: Mothers' risk (severity and susceptibility) will be positively associated with mother-daughter talk efficacy about STD risks.

H6: Mothers' efficacy beliefs will be positively associated with mother-daughter talk efficacy about STD risks.

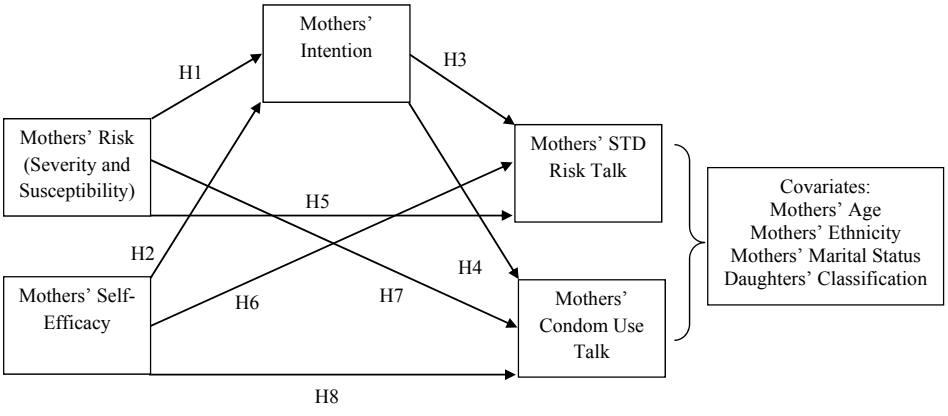
H7: Mothers' risk (severity and susceptibility) will be positively associated with mother-daughter talk response efficacy about condom use.

H8: Mothers' efficacy beliefs will be positively associated with mother-daughter talk response efficacy about condom use.

3 The present study

The objective of this study is to draw from the RPA framework to contribute to the mother-daughter communication literature in twofold ways. First, this study focuses on the mother's perceptions of risks and efficacy of preventing their daughters from getting an STD due to risky sexual behaviour, and mother's communication intentions to daughters about the risks and importance of condom use behaviour. Second, this study seeks to fulfil the gap of mother-daughter communication about condom use and sexuality using a mothers' perspective. Most of the studies focus on only the daughters' perspective. Lastly, previous studies have been less theoretically-based. However, this study is driven by the constructs of the RPA framework to help inform future studies about mothers' role in influencing daughters' risk reduction techniques. As such, the following paths will be examined in this study (see Figure 1).

Figure 1 Hypothesised model using RPA framework



Note: Hypothesised path analysis model using the RPA framework with mothers' risk, self-efficacy, intention, STD risk talk and condom use talk. Covariates entered in the model included mothers' age, ethnicity, marital status and daughters' classification. * $p < .05$ ** $p < .01$, *** $p < .001$

4 Method

4.1 Participants

The study included 90 mothers of young college women. Mothers were recruited from 90 daughters enrolled in a large southwestern university after obtaining IRB approval. The average age of the mothers was 48 ($SD = 6.98$). The ethnicity background of mothers was 67.8% Caucasian, 11.1% Hispanic/Latin, 10% African-American, 3.3% Asian-American, 1.1% Native-American and 6.7% other. The marital status of mothers was 6.7% single, 74.4% married, 15.6% divorced and 3.3% other. Mothers reported that the classification of their daughters were 1.1% freshman, 24.4% sophomore, 37.8% junior and 36.7% senior.

4.2 Design

This cross-sectional study employed a correlation design using a survey methodological approach with convenient and network sampling. Referral sampling reflects using a convenient population such as college students to help recruit individuals who fulfil the inclusion criteria of the study such as women who have a child or children (e.g., mothers). The independent variables included mothers' risk (severity and susceptibility), efficacy beliefs, and behavioural intention. The dependent variables included mothers' intentions to communicate to their daughters about condom use, mother-daughter talk efficacy about STD risks, mother-daughter talk response efficacy about condom use, and mother-daughter talk response efficacy about condom use. The covariate variables included mother's age, ethnicity, marital status and their daughters' classification in school (e.g., freshman, senior).

4.3 Procedures

After IRB approval, a convenient sampling method was conducted by sending a recruitment script to women enrolled in undergraduate communication courses. The undergraduate college women were asked to email a same-sex parent a web link to an online questionnaire via Qualtrics relating to STD prevention in college campuses. College women were given a small offering of extra credit for their participation on the recruitment of their mothers for this study. Once mothers received the link to the online questionnaire they were asked to fill out demographic information and mother-daughter communication questions related to both risk perception and self-efficacy regarding STD prevention.

4.4 Measures

Mothers' perceived risk (i.e., susceptibility; severity) and efficacy (i.e., self-; response) were measured using Risk Perception Attitude (RPA) driven scale items from the Risk Behavioural Diagnostic (RBD) scale (Witte et al., 1996). Mothers' intention was measured using the recommendations of Ajzen and Fishbein (1980); Witte et al. (1996) and Krieger et al. (2011).

Susceptibility: Mothers' perceived susceptibility of their daughters was measured using three items on a scale of 1 (*strongly disagree*) to 7 (*strongly agree*). The susceptibility items included "If my daughter had unprotected sex, my daughter is at risk for getting an STD for unprotected sex," "If my daughter had unprotected sex, my daughter could get an STD," and "If my daughter had unprotected sex, my daughter has a high chance for getting an STD." Higher scores indicate higher susceptibility and lower scores indicate lower susceptibility. The Cronbach's alpha reliability for susceptibility in this study was .84.

Severity: Mothers' perceived severity of their daughters was measured using three items on a 7-point scale of 1 (*strongly disagree*) to 7 (*strongly agree*). The items include "If my daughter were to get an STD it would be a very serious threat to her quality of life," "If my daughter were to get an STD it would be a very severe threat to her health," and "If my daughter were to get an STD it would be harmful to her well-being." Higher scores are reflective of higher perceived severity. The Cronbach's alpha reliability for this scale was .94.

Mother-daughter communication self-efficacy about condom use: Mothers' self-efficacy was measured using three items on a 7-point scale of 1 (*strongly disagree*) to 7 (*strongly agree*). Scale items included "I would feel comfortable encouraging my daughter to use a condom to prevent getting an STD," "It would be easy to encourage my daughter to use a condom to prevent getting an STD," and "It would be simple to encourage my daughter to use a condom to prevent getting an STD." Higher scores indicated higher self-efficacy. The Cronbach's alpha reliability for this scale was .84.

Mother-daughter communication self-efficacy about STD risks: Mother-daughter communication self-efficacy about STD risks was assessed using three scale items. These items include, "I would be comfortable talking to my daughter about the risks involved in getting an STD," "It would be easy to talk to my daughter about the risks involved in getting an STD," and "It would be simple to talk to my daughter about the risks involved in getting an STD." Items ranged in a 7-point scale of 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores reflective higher self-efficacy. The Cronbach's alpha reliability for this scale is .95.

Mother-daughter communication response-efficacy for condom use: Mother-daughter communication about condom use behaviour was measured using three items, "Talking to my daughter about the use of condoms during sexual intercourse is an effective way to prevent her from getting an STD," "Talking to my daughter about the use of condoms during sexual intercourse is a safe way to prevent her from getting an STD," and "Talking to my daughter about the use of condoms during sexual intercourse is a useful way to prevent her from getting an STD." The 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores reflect higher communication response efficacy. The Cronbach's alpha reliability for this scale was .95.

Mothers' communication intention: Mothers' behavioural intention to communicate about the using condoms to prevent STDs to their daughters was measured using three items on a 7-point scale of 1 (*strongly disagree*) to 7 (*strongly agree*). These items include "I intent to encourage my daughter to use condoms during sexual intercourse," "I will encourage my daughter to use condoms during sexual intercourse," and "I plan to encourage my daughter to use condoms during sexual intercourse." The Cronbach's alpha reliability for this scale was .94.

5 Analysis

Pairwise correlation coefficients were conducted to examine the association of the independent and dependent variables of this study using SPSS 22.0. A series of multivariate hierarchical regression models were used to assess the relationship between mother-daughter communication intentions about condom use and mother's perceived risk and efficacy; mothers' efficacy to talk about STD risks to their daughters and mothers' perceived threat and efficacy; and mothers' response efficacy to talk about condom use to their daughters and mothers' perceived risk and efficacy. The models analysed included the covariates (e.g., mothers' age, ethnicity, etc.). Path analyses using standardised coefficients illustrated the relationships across the eight hypotheses. There was no inflation evidence for multicollinearity.

6 Results

Table 1 demonstrates the correlations and interrelationship between all the constructs and Table 2 shows the regression coefficients and statistics across the steps used in the examination of hypothesis one and two. After entry of all the covariate and independent variables, the overall result was R =.83, ΔR^2 = 0.05, F (4, 83) = 24.93, p <.001. Only mother's ethnicity related to mother's intentions to talk to their daughters about condom use, β = –0.27, t (85) = –2.50, p <.05. Step one assessed the covariates (mothers' age, ethnicity, marital status, and daughter's classification) relation to mothers' intentions to talk to their daughters about condom use, R^2 = .10, F (4, 79) = 2.05, p = .10. Step two assessed severity, R^2 = .13, F (5, 78) = 2.28, p = .054. Step three with susceptibility added into the equation, along with severity to assess threat produced an overall R^2 =.17, F (6, 77) = 2.68, p <.05. The fourth step added mothers' self-efficacy into the equation, with the overall R^2 =.84, F (7, 76) = 24.93, p <.001. Mothers' self-efficacy yielded a significant increment in R^2.

Table 1 Reporting correlations of variables and descriptive statistics

Variable	*1*	*2*	*3*	*4*	*5*	*6*
1. Self-efficacy	1					
2. Severity	0.28**	1				
3. Susceptibility	0.30**	0.40**	1			
4. Intention	0.80**	0.13	.32**	1		
5. Risk talk	0.73**	0.27**	0.41**	0.80**	1	
6. Condom use talk	0.70**	0.14	0.62**	0.62**	0.62**	1
Mean	13.65	13.62	14.19	14.08	13.67	13.33
Standard deviation	2.44	2.16	1.71	2.10	2.47	2.48

Note: $^{**}p < 0.01$.

Table 2 Hierarchical multiple regression of last intention model

Variables	r^a	β^b	ΔR^2
Step 1: Covariates			
Mothers' age	.09	.10	0.05
Mothers' ethnicity	–.25*	–.27	0.05
Mothers' marital status	–11	–.15	0.05
Daughter's classification	–.01	–.01	0.05
Step 2: Severity	0.36	.19	.072
Step 3: Susceptibility	0.42*	.24	.11
Step 4: Self-efficacy	0.804***	.80	.67

Notes: [a]Zero-Order Pearson Correlations between predictor and mother's intentions;
[b]Standardised beta from the regression equation block.

The first hypothesis proposed that mothers' risk (susceptibility and severity) will be positively related to mother-daughter intention to talk to their daughters about condom use. Hypothesis one was supported in step two, $\beta = .42$, $t\ (85) = 4.31$, $p < .05$. Mothers' perceived risk accounted for 17% of the variance in mother's intention to talk to their daughters about condom use.

The second hypothesis proposed that mothers' efficacy will be positively related to mothers' intentions. Hypothesis 2 was supported in the third step of the regression equation. Controlling for mothers' risk, mothers' efficacy belief was positively related to mothers' behavioural intention to talk about condom use, $\beta = .80$, $t\ (83) = 11.45$, $p < .001$. Mothers' self-efficacy accounted for 84% of the variance in mother's intentions to talk about condom use.

To assess the third and fourth hypotheses, bivariate correlations were conducted. The third hypothesis posed that mothers' intention is positively related with mother-daughter efficacy talk about STD risks was also supported, $r = .80$ $p < .001$. The fourth hypothesis posed that mother's intention is positively associated with mother-daughter response-efficacy talk about condom use was supported, $r = .62$, $p < .001$.

Table 3 demonstrates the regression coefficients of the independent variables that correspond with the results of the fifth hypothesis. The overall was $R = .60$, $F\ (1, 75) =$

16.18, p <.001. Step one assessed the covariate variables (R^2 = .10, F (4, 79) = 2.05, p = .10), but none of them related to other factors in the model (See Table 3). Step three severity, R^2 = .15, F (5, 77) = 1.10, p <.05. Step three with susceptibility added into the equation, along with severity, the overall R^2 =.22, F (6, 76) = 3.55, p <.01. The fourth step added mothers' self-efficacy into the equation, with the overall R^2 =.60, F (7, 75) = 16.18, p <.001. Mothers' self-efficacy yielded a significant increment in R^2.

Table 3 Hierarchical multiple regression of last risk talk model

Variables	r^a	β^b	ΔR^2
Step 1: Covariates			
Mothers' age	.08	.07	0.01
Mothers' ethnicity	–.15	–.18	0.01
Mothers' marital status	–.12	–.14	0.01
Daughter's classification	.05	.05	0.01
Step 2: Severity	0.38**	0.31	0.10
Step 3: Susceptibility	0.47**	0.30	0.16
Step 4: Self-efficacy	0.78***	0.68	0.57

Notes: [a]Zero-Order Pearson Correlations between predictor and risk talk to daughters;
[b]Standardised beta from regression equation block.

The fifth hypothesis proposed that mothers' risk (susceptibility and severity) will be positively related to mother-daughter talk efficacy about STD risks. Hypothesis five was supported in step three, β = .47, t (82) = 1.60, p < .01. Mothers' perceived risk accounted for 17% of the variance in mother-daughter talk efficacy about STD risks.

The sixth hypothesis proposed that mother's efficacy will be positively related to mother-daughter talk about STD risks. Hypothesis 6 was supported in the fourth step of the regression equation. Controlling for covariates, mothers' perceived risk, mothers' efficacy belief was positively related to mother-daughter talk efficacy about STD risks, β = .68, t (82) = 8.49, p <.001. Mothers' self-efficacy accounted for 60% of the variance in mother-daughter talk efficacy about STD risks.

Table 4 shows the regression coefficients and statistics after the entry of the independent variables of interest with the overall R =.71, F (1, 76) = 11.58, p <.001. Step one examined the covariates relation to the model; however, none of the covariates related to the factors, R^2 = .04, F (4, 79) = 0.83, p = .51. Step two assessed severity, R^2 = .13, F (5, 78) = 2.40, p <.05. Step three with susceptibility added into the equation, along with severity, the overall R^2 =.13, F (6, 77) = 1.97, p = .08. The fourth step added mothers' self-efficacy into the equation, with the overall R^2 =.52, F (7, 76) = 11.58, p <.001. Mothers' self-efficacy yielded a significant increment in R^2.

The seventh hypothesis proposed that mothers' risk (susceptibility and severity) will be positively related to mother-daughter talk efficacy about condom use. Hypothesis one was partially supported in step two (severity), β = .37, t (85) = 2.89, p <.01. Mothers' perceived risk accounted for 6% of the variance in mother-daughter talk efficacy about condom use.

The eighth hypothesis proposed that mothers' efficacy will be positively related to mother-daughter talk efficacy about condom use. Hypothesis 8 was supported in the fourth step of the regression equation. Controlling for mothers' risk, mothers' efficacy

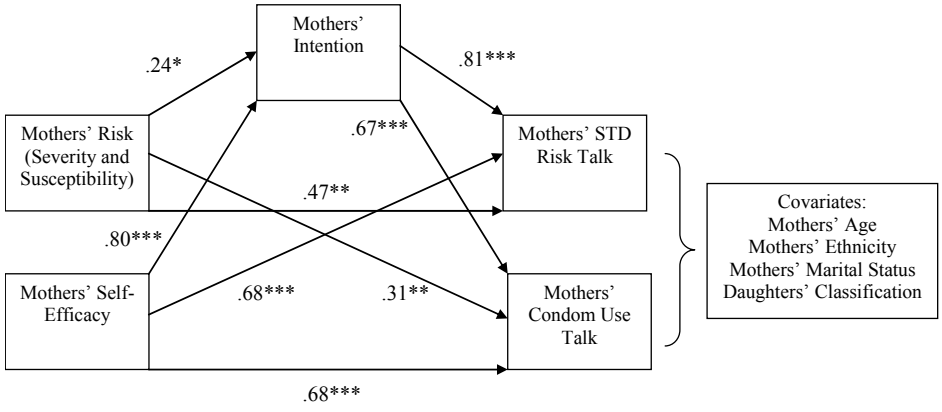
belief was positively related to mother-daughter talk efficacy about condom use, $\beta = .68$, t (83) = 7.75, p <.001. Mothers' self-efficacy accounted for 52% of the variance in mother-daughter response-efficacy talk about condom use. To summarise all hypotheses findings of this study, Figure 2 demonstrates the relationships among the variables using the RPA framework.

Table 4 Hierarchical multiple regression of last condom use talk model

Variables	r^a	β^b	ΔR^2
Step 1: Covariates			
Mothers' Age	0.11	0.13	–0.01
Mothers' ethnicity	–0.01	–0.03	–0.01
Mothers' marital status	–0.15	–0.17	–0.01
Daughter's classification	0.03	0.01	–0.01
Step 2: Severity	0.37**	0.31	0.08
Step 3: Susceptibility	0.37	–0.01	0.07
Step 4: Self-efficacy	0.72***	0.68	0.47

Notes: [a]Zero-Order Pearson Correlations between predictor and condom use talk to daughters; [b]Standardised beta from the regression equation block.

Figure 2 Hypothesised path analysis model using RPA framework



Note: Hypothesised path analysis model using the RPA framework with mothers' risk, self-efficacy, intention, STD risk talk and condom use talk. Covariates entered in the model included mothers' age, ethnicity, marital status and daughters' classification. Standardised regression coefficients indicate the strength and direction of the effects between variables. * p < .05 ** p < .01, *** p < .001

7 Discussion

This study examined several models with factors driven by Rimal and Real's (2003) RPA framework. The findings of the models revealed that the RPA framework is useful for predicting mothers' communication response efficacy and behavioural intentions to

communicate with their daughters about STD risks and condom use behaviour based on mothers' perceived risks (severity and susceptibility). This section will discuss the findings and the implications.

A major finding of this study was that mothers' perceived risk accounted for 10% of the variance in mothers' behavioural intention to talk to their daughters about condom use during sexual intercourse. Mothers' self-efficacy was shown to account for 65% of the variance in mothers' intention to talk about condom use to prevent STDs. Mothers' self-efficacy explained a greater level of variance (65% versus 10%) of intentions to talk to daughters about condom use. The finding suggests that even though mothers may perceive a risk for their daughters, some mothers will not intend to communicate to their daughters about preventing perceived STD risks via condom use. Yet, if mothers are efficacious they may have the intention to communicate to their daughters about sexual safety, in spite of the perceived STD risks, which may lead to communicating to their daughters about STD prevention. This corresponds to previous sexual health and prevention studies that found that mothers' efficacy of communicating may lead to mothers' behavioural intentions to communicate to their daughters about sexual risks (Askelson et al., 2012). Similarly, another study suggested that perceived self-efficacy serves as an effective predictor of behavioural intentions (Murray, 2007).

The study also found that mothers' intention is positively and very strongly associated to mother-daughter talk efficacy about STD risks. Thus, mothers who intend to communicate to their daughters about STD risks may be likely to engage in the communicative behaviours, and those without these intentions, may not engage in communicative behaviours with their daughters. In addition, mothers' intention is positively and strongly related to mother-daughter talk efficacy about condom use. Previous studies have made the link between intention and communication from the daughter's perspective (Seal and Palmer-Seal, 1996), and more studies need to make the link with the mothers' perspective (Askelson et al., 2010). Therefore, this finding suggests that mothers who intend to talk to their daughters about condom use may perform the communicative behaviours to increase condom use of their daughters, and those without intentions may not communicate to their daughters about condom use to prevent sexual infections.

Another major finding was that mothers' perceived risk accounted for 17% of the variance in mother-daughter talk efficacy about their daughters' risks of getting an STD in college. On the other hand, mothers' self-efficacy explained 56% of the variance in mother- mother-daughter talk efficacy about daughters' risks of getting an STD than the perceived risk. Mothers' self-efficacy explained more of the variance in aligned with similar findings that suggest that the majority of mothers report communicating to their daughters about the risks involved in unprotected sex such as getting an STD (e.g., herpes, chlamydia) when they feel comfortable doing so (Wyckoff et al., 2008; Askelson et al., 2012). Likewise, parental perceived threat has been shown to be generally accurate reflection of college student's reported sexual health risks (e.g., getting genital HPV infections) (Mays, Sturm, and Zimet, 2004; Bylund et al., 2005). Similarly, self-efficacy has been shown to engage in behaviours to reduce STD risks (Lauby et al., 2001). Therefore, although perceived risks may predict mother-daughter talk response efficacy about STD risks, self-efficacy is the main predictor of mother-daughter talk efficacy about STD risks.

This study also found that mothers' risk and efficacy were predictors of mother-daughter talk response about condom use behaviour. Mothers' perceived threat explained 6% of the variance in mother-daughter talk response and mother's self-efficacy explained

48% of the variance in mother-daughter talk response about condom use behaviour. Similarly, mother's self-efficacy explained more of the variance than the perceived threat (48% versus 6%). Previous studies suggest that the majority of mothers are expected to be the educator of sexuality of their daughters about STD prevention, including discussing about the importance of condom use in sexual relations (Wyckoff et al., 2008; Karofsky et al., 2000; Rodgers, 1999). Yet, only efficacious mothers may be more effective at communicating messages of condom use to their daughters (Baele et al., 2001). For this reason, effective parent-child communication about condom use has been shown to lead to safe-sex behaviour in young adult daughters (Booth-Butterfield and Sidelinger, 1998). Thus, in the overall models of this study, mothers' self-efficacy is the strongest predictor of mothers' communicative intentions, and communication responses about STD risks and condom use to prevent sexual infections.

8 Limitations, strengths and future directions

There are several limitations from this study that must be discussed. First, the study relied on the self-report surveys that were completed by the mothers and this affects the study's generalisability. Future studies should employ other measures that use self-reports in an online survey with a combination of other methods. For instance, observational methods may inform the literature of the specific strategies that mothers use in communicating about STD risks and condom use to their daughters. Second, the sample size was moderately small. Given that fathers and other maternal figures (e.g., grandmothers, aunts) were excluded from this study, only mothers were included in the data, and this reduced the sample size potential of this important study. Third, this study focused only on mothers' perspective about their own communicative intentions and response efficacy communication. Future studies may also include daughters' reports of their mothers' actual behaviours to examine mothers' effect on their daughters.

While the present study has these limitations, the study also has strengths to consider. First, this study extends the mother-daughter communication literature on mothers' communicative intentions, STD communication self-efficacy and response self-efficacy about communicating with daughters about condom use to promote sexual safety. Second, this study used constructs from both the RPA that served well to hypothesise the models that effectively predicted behavioural intentions of mother-daughter communication about STD risks and condom use. Third, the reliabilities of all the measures were high, which suggests that the measurement scales can be used in the future examination of this imperative sexual relationship issue.

To conclude, efficacious mothers are more likely to be effective at conversing about STD risks and condom use to potentially reduce their daughters' risky behaviours (Miller et al., 1998). This study helps to support the assertion that mother-daughter communication about STD risks and condom use may aid in decreasing the odds of sexually transmitted infections in young adults. Mothers' confident involvement in discussing safe sex with their daughters is crucial and this research deserves more attention given the increasing rates of STDs in college campuses (CDC and Prevention, 2009). The role of perceived risks and self-efficacy are shown to be important to promoting safe sex and STD risk communication between mothers and daughters. Mother-daughter communication is only a key to solving the problem of STD prevention and more scholarship needs to focus on preventative communicative strategies.

References

Ajzen, I. and Fishbein, M. (1980) *Understanding Attitudes and Predicting Social Behaviour*, Prentice-Hall, Englewood Cliffs.

American College Health Association (2009) *American College Health Association –National College Health Assessment*, Health Association, American College, Baltimore.

Askelson, N.M., Campo, S. and Lowe J. et al. (2010) 'Using the theory of planned behavior to predict mothers' intentions to vaccinate their daughters against HPV', *The Journal of School Nursing*, Vol. 26, No. 3, pp.194–202.

Askelson, N.M., Campo, S. and Smith, S. (2012) 'Mother-daughter communication about sex: the influence of authoritative parenting style', *Health Communication*, Vol. 27, No. 5, pp.439–448.

Baele, J., Dusseldrop, E. and Maes, S. (2001) 'Condom use self-efficacy: effect on intended and actual condom use in adolescents', *Journal of Adolescent Health*, Vol. 28, pp.421–431.

Booth-Butterfield, M. and Sidelinger, R. (1998) 'The influence of family communication on the college-aged child: openness, attitudes, and actions about sex and alcohol', *Communication Quarterly*, Vol. 46, pp.295–308.

Brown, L., Danovsky, M. and Lourie, K. et al. (1997) 'Adolescents with psychiatric disorders and the risk of HIV', *Journal of the American Academy of Child and Adolescent Psychiatry*, Vol. 36, pp.1609–1617.

Buunk, B.P., Bakker, A.B. and Siero, F.W. et al. (1998) 'Predictors of AIDS-preventative behavioral intentions among adult heterosexuals at risk for HIV-infection: extending current models and measures', *AIDS Education and Prevention*, Vol. 10, No. 2, pp.149–172.

Bylund, C.L., Imes, R.S. and Baxter, L.A. (2005) 'Accuracy of parents' perceptions of their college student children's health and health risk behaviors', *Journal of American College Health*, Vol. 54, pp.31–37.

Cederbaum, J.A., Hutchinson, M.K. and Duan, L. et al. (2012) 'Maternal HIV seratus, mother-daughter sexual risk communication and adolescent HIV risk belief and intentions', *AIDS Behavior*, Vol. 17, pp.2540–2553.

Centers for Disease Control and Prevention (2009) *Sexually Transmitted Disease Surveillance*. Available online at: http://www.cdc.gov/STD/stats08/main.htm

DiClemente, R.J., Wingood, G.M., Crosby, R., et al. (2001) 'Parent-adolescent communication and sexual risk behaviors among African American adolescent females', *The Journal of Pediatrics*, Vol. 139, pp.407–412.

DiIorio, C., Kelley, M. and Hockenberry-Eaton, M. (1999) 'Communication about sexual issues: mothers, fathers, and friends', *Journal of Adolescent Health*, Vol. 24, pp.181–189.

DiIorio, C., Pluhar, E. and Belcher, L. (2003) P'arent-child communication about sexuality: a review of the literature from 1980–2002', *Journal of HIV/AIDS Prevention and Education for Adolescents and Children*, Vol. 5, pp.7–32.

Dittus, P.J., Jaccard, J. and Gordon, V.V. (1999) 'Direct and nondirect communication and maternal beliefs to adolescents: adolescent motivation for premarital sexual activity', *Journal of Applied Social Psychology*, Vol. 29, pp.1927–1963.

Donenberg, G.R., Emerson, E., and Mackesy-Amiti, M.E. (2011) 'Sexual risk among African American girls: psychopathology and mother-daughter relationships', *Journal of Consulting and Clinical Psychology*, Vol. 79, No. 2, pp.153–158.

Dutra, R., Miller, K.S. and Forehand, R. (1999) 'The process and content of sexual communication with adolescents in two-parent families: associations with sexual risk-taking behavior', *AIDS and Behavior*, Vol. 3, pp.59–66.

Fox, G.L. and Inazu, J.K. (1980) 'Patterns and outcomes of mother-daughter communication about sexuality', *Journal of Social Issues*, Vol. 36, pp.7–29.

Garcia-Retamero, R. and Cokely, E.T. (2011) 'Effective communication of risks to young adults: using message framing and visual aids to increase condom use and STD screening', *Journal of Experimental Psychology: Applied*, Vol. 17, No. 3, pp.270–287.

Gilligan, C. (1982) *In a Different Voice: Psychological Theory and Women's Development*, Harvard University Press, Cambridge.

Guilamo-Ramos, J.J. and Dittus, P. et al. (2008) 'Parent-adolescent communication about sexual intercourse: an analysis of maternal reluctance to communicate', *Health Psychology*, Vol. 27, No. 6, pp.760–769.

Hutchinson, M.K. (2002) 'The influence of sexual risk communication between parents and daughters on sexual risk behaviors', *Family Relations*, Vol. 51, No. 3, pp.238–248.

Hutchinson, M.K. (2006) 'Individual, family, and relationship predictors of young women's sexual risk perceptions', *Journal of Obsteric, Gynecologic and Neonatal Nursing*, Vol. 28, pp.60–67.

Hutchinson, M.K., Jemmott, J.B. and Jemmott, L.S. et al. (2003) 'The role of mother-daughter sexual risk communication in reducing sexual risk behaviors among urban adolescent females: a prospective study', *Journal of Adolescent Health*, Vol. 33, No. 2, pp.98–107.

Jaccard, J., Dodge, T. and Dittus, P. (2002) 'Parent-adolescent communication about sex and birth control: a conceptual framework', *New Directions for Child and Adolescent Development*, Vol. 97, pp.9–41.

Jemmott, J.B., Jemmott, L.S. and Fong, G.T. (1992) 'Reductions in HIV risk-associated sexual behaviors among black male adolescents: effects of an AIDS prevention intervention', *American Journal of Public Health*, Vol. 82, No. 3, pp.372–377.

Jemmott, J.B., Jemmott, L.S. and Spears, H. et al. (1992) 'Self-efficacy, hedonistic expectancies, and condom-use intentions among inner-city black adolescent women: a social cognitive approach to AIDS risk behavior', *Journal of Adolescent Health*, Vol. 13, No. 6, pp.512–519.

Kahn, J.A., Ding, L. and Huang, B. et al. (2009) 'Mothers' intention for their daughters and themselves to receive the human papillomavirus vaccine: a national study of nurses', *Pediatrics*, Vol. 123, No. 6, pp.1439–1445.

Karofsky, P., Zeng, L. and Kosorok, M.R. (2000) 'Relationship between adolescent-parental communication and initiation of first intercourse by adolescents', *Journal of Adolescent Health*, Vol. 28, pp.41–45.

Krieger, J.L., Kam, J.A. and Katz, M.L. et al. (2011) 'Does mother know best? An actor-partner model of college-aged women's human papillomavirus vaccination behavior', *Human Communication Research*, Vol. 37, pp.107–124.

Lauby, J.L., Semaan, S. and O'Connell, A. et al. (2001) 'Factors related to self-efficacy for use of condoms and birth control among women at risk for HIV infection', *Women and Health*, Vol. 34, No. 3, pp.71–91.

Lefkowitz, E.S. and Espinosa-Hernandez, G.E. (2007) 'Sex-related communication with mothers and close friends during the transition to university', *Journal of Sex Research*, Vol. 44, pp.17–27.

Lefkowitz, E.S., Boone, T.L. and Shearer, C.L. (2004) 'Communication with best friends about sex-related topics during emerging adulthood', *Journal of Youth and Adolescence*, Vol. 33, pp.339–351.

Martino, S.C., Elliott, M.C. and Corona, R. et al. (2008) 'Beyond the "big talk": the roles of breadth and repetition in parent-adolescent communication about sexual topics', *Pediatricsm*, Vol. 121, No. 3, pp.612–618.

Mays, R.M., Sturm, L.A. and Zimet, G.D. (2004) 'Parental perspectives on vaccinating children against sexually transmitted infections', *Social Science and Medicine*, Vol. 58, pp.1405–1431.

McCaul, K.D. and Mullens, A. (2003) 'Affect, thought, and self-protective health behavior: the case of worry and cancer screening', in Suls, J. and Walston, K.A. (eds): *Social Psychological Foundations of Health and Illness*, Blackwell Publishing, Malden, pp.137–168.

McKay, M., Baptiste, D. and Coleman, D. et al. (2000) 'Preventing HIV risk exposure in urban communities: the CHAMP family program', in: Pequegnatz, W. and Szapocznic, J. (Eds): *Working with Families in the Era of HIV/AIDS*, Sage, London, pp.67–87.

Miller, K.S., Levin, M.L. and Whitaker, D.J. et al. (1998) 'Patterns of condom use among adolescents: the impact of mother-adolescent communication', *American Journal of Public Health*, Vol. 88, pp.1542–1544.

Murray, T. (2007) 'Distinguishing among perceived control, perceived difficulty, and self-efficacy as determinants of intentions and behaviours', *The British Journal of Social Psychology*, Vol. 47, No. 4, pp.607–630.

Parkes, A., Henderson, M. and Wight, D. et al. (2011) 'Is parenting associated with teenagers' early sexual risk-taking, autonomy and relationship with sexual partners?', *Perspectives on Sexual and Reproductive Health*, Vol. 43, pp.30–40.

Pequegnat, W. and Szapocznik, J. (2000) 'The role of families in preventing and adapting to HIV/AIDS: issues and answers', *Working with Families in the Era of HIV/AIDS*, Sage Publication, Thousand.

Pistella, C.L.Y. and Bonati, F.A. (1998) 'Communication about sexual behavior among adolescent women, their families, and their peers', *Families in Society: The Journal of Contemporary Human Services*, Vol. 79, pp.206–211.

Real, K. (2008) 'Information seeking and workplace safety: a field application of the risk perception attitude framework', *Journal of Applied Communication Research*, Vol. 36, pp.339–359.

Rimal, R.N. and Juon, H.S. (2010) 'Use of the risk perception attitude framework for promoting breast cancer prevention', *Journal of Applied Social Psychology*, Vol. 40, pp.287–310.

Rimal, R.N. and Real, K. (2003) 'Perceived risk and efficacy beliefs as motivators of change: use of the risk perception attitude (RPA) framework to understand health behaviors', *Human Communication Research*, Vol. 29, No. 3, pp.370–399.

Rimal, R.N., Bose, K. and Brown, J. et al. (2009) 'Extending the purview of the risk perception attitude framework: findings from HIV/AIDS prevention research in Malawi', *Health Communication*, Vol. 24, pp.210–218.

Rimal, R.N., Flora, J.A. and Schooler, C. (1999) 'Achieving improvements in overall health orientation: effects of campaign exposure, information seeking, and health media use', *Communication Research*, Vol. 26, pp.322–348.

Roberto, A. and Goodall, C.E. (2009) 'Using the extended parallel process model to explain physicians' decisions to test their patients for kidney disease', *Journal of Health Communication*, Vol. 14, No. 4, pp.400–412.

Roberts, M.E., Gerrard, M. and Reimer, R. et al. (2010) 'Mother-daughter communication and human papillomavirus vaccine uptake by college students', *Pediatrics*, Vol. 125, No. 5, pp.982–989.

Robin, L., Dittus, P. and Whitaker, D. et al. (2004) 'Behavioral interventions to reduce incidence of HIV, STD, and pregnancy among adolescents: a decade in review', *Journal of Adolescent Health*, Vol. 34, pp.3–26.

Rodgers, K.B. (1999) 'Parenting processes related to sexual risk-taking behaviors of adolescent males and females', *Journal of Married and the Family*, Vol. 61, pp.99–109.

Seal, D.W. and Palmer-Seal, D.A. (1996) 'Barriers to condom use and safer sex talk among college dating couples', *Journal of Community and Applied Social Psychology*, Vol. 6, pp.15–33.

Unicef (2020) *Adolescent HIV prevention*. Available online at: https://data.unicef.org/topic/hivaids/adolescents-young-people/

Weinstock, H., Berman, S. and Willard, C.J. (2004) 'Sexually transmitted diseases among American youth: Incidence and prevalence estimates, 2000', *Perspectives on Sexual and Reproductive Health*, Vol. 36, pp.6–10.

Whaley, A.L. (1999) 'Preventing the high-risk sexual behavior of adolescents: focus on HIV/AIDS transmission, unintended pregnancy, or both?', *Journal of Adolescent Health*, Vol. 24, No. 6, pp.376–382.

Whitaker, D. and Miller, K. (2000) 'Parent-adolescent discussions about sex and condoms: impact on peer influences on sexual risk behavior', *Journal of Adolescent Research*, Vol. 15, pp.251–273.

Whitaker, D.J., Miller, K.S. and May, D.C. et al. (1999) 'Teenage partners' communication about sexual risk and condom use: the importance of parent-teenager discussions', *Family Planning Perspectives*, Vol. 31, pp.117–121.

Witte, K., Cameron, K.A. and McKeon, J.K. et al. (1996) 'Predicting risk behaviors: development and validation of a diagnostic scale', *Journal of Health Communication*, Vol. 1, No. 4, pp.317–341.

Wong, N. (2009) 'Investigating the effects of cancer risk and efficacy perceptions on cancer prevention adherence and intentions', *Health Communication*, Vol. 24, pp.95–105.

Wyckoff, S.C., Miller, K.S. and Forehandm, R. et al. (2008) 'Patterns of sexuality communication between preadolescents and their mothers and fathers', *Journal of Child and Family Studies*, Vol. 17, pp.649–662.