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Attitudes and subjective norms: determinants of parents' intentions to reduce childhood fever with medications

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Abstract

Fever is a natural protective response of the host organism. Mild to moderate fevers, up to 40.0°C, have immunological benefits and do not need to be reduced. However, parents regularly reduce fever with medications to prevent perceived harmful outcomes. This study identified the determinants of parents' intentions to reduce childhood fever with medications. A community-based cross-sectional survey was conducted with 391 Australian parents of children aged between 6 months and 5 years. Recruitment was through advertising, face-to-face and snowball methods. The survey targeted constructs of the Theory of Planned Behavior: attitudes, subjective norms, perceived behavioral control, intentions and previously identified background factors. Structural equation modeling identified 69% of the variance in intentions. The strongest influences were from non-scientifically based attitudes (phobic) ($\beta = 0.55$) and subjective norms (husband/partner and doctors) ($\beta = 0.36$). Attitudes ($\beta = 0.69$) and subjective norms ($\beta = 0.52$) were strongly determined by child medication behavior (whether the child took medications easily when febrile) which had a total effect on intentions of $\beta = 0.66$. Perceived control, education and number of children had minimal influence on intentions. There is an urgent need for (i) the education of both parents in the benefits of fever and (ii) for doctors to consistently provide parents with evidence-based information.

Introduction

Parents' fear of fever in their children and their resultant overuse of medications to normalize fever is well documented and continues despite evidence-based guidelines [1–5]. In 1980, Schmitt [6] coined a term 'fever phobia' to define parents' unrealistic fears about fever. Literature reporting parents' incorrect knowledge, phobic beliefs and practices and effective educational programs targeting specific knowledge, beliefs and practices is extensive [7]. However, with the exception of increased medication use and alternating medications, little has changed during the past three decades [1, 2, 5]. Today, 91–95% of parents prefer to use over-the-counter medications (ibuprofen and acetaminophen) to control and reduce fever [2], a 28% increase from 1980 [6]. When fever is not sufficiently reduced by an antipyretic, or returns, 52–67% of parents administer an alternative antipyretic, [2, 5] a marked increase from 21% of parents in 2001 [1]. Associated with their reliance on medications is a 45–53% increase in incorrect medication dosing [8, 9], and overdosing, with ibuprofen more frequently than acetaminophen [2, 9]. These figures are alarming. To address these unnecessary and potentially harmful practices, it is essential to identify the factors influencing parents' use of medications to reduce fever. Fever, in response to infection, is a natural, highly integrated

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body response to invading organisms [10, 11]. It is therefore timely for a comprehensive, theoretical exploration of the predictors of parents' fever management which has not previously been reported. This study addresses the deficit by identifying modifiable determinants of parents' intentions to use medications to reduce fever through the Theory of Planned Behavior (TPB).

There has been a substantial increase in understanding of the physiology of fever over the past decade. Fever is a host defense response to invasion from microbial pathogens such as bacteria and viruses [10]. Mechanisms involved in temperature regulation lie in the intrinsic properties of the neurons in the anterior hypothalamus and in the release of endogenous antipyretic substances (naturally occurring antipyretics) which antagonize the effects of pyrogens on these neurons [11, 12]. There is a generally held view that the genesis of pathogen-induced fever, or the febrile response, occurs in an integrated series of sequential steps. In humans and most mammals, fever is controlled by endogenous antipyretics and has an upper limit ranging from 41.0 to 42.0°C [11, 12]. Most infections produce fevers between 38.5 and 40.5°C with an average fever of 39.5°C [11, 12]. Enhanced immunological processes are evident at most elevated temperatures, particularly low and moderate fevers, up to 40.0°C [11].

The TPB predicts the cognitive determinants of behavioral intentions [13, 14]. It asserts that there is a strong relationship between behavioral intentions and behavior and identifies the determinants of behavioral intentions in situations where people do not have complete volitional control and when people are not necessarily motivated to or interested in changing behavior [13–15]. The TPB predictive ability in health-related behaviors has been demonstrated through a number of reviews including meta-analyses [15–17].

In accordance with the TPB, there are three basic determinants to a person's intention to perform a behavior:

- attitudes toward the behavior or the degree to which performance of the behavior is positively or negatively valued;
- subjective norms or the person's perceived social pressure to engage or not engage in a behavior and
- perceived behavior control, their perceptions of their ability to perform the given behavior [18].

A person intends to perform a behavior when they evaluate it positively, experience social pressure to perform it and believe they have the means and opportunity to do so. Attitudes are determined by a person's belief in the positive or negative outcomes from a behavior and their evaluation of those beliefs. Subjective norms indicate a person's perceptions of other people's expectations of them in relation to the behaviour and the person's motivation to comply with these perceived expectations. Perceived behavioral control (PBC) includes beliefs about control over the behavior and confidence in performing the behavior [18].

The TPB also recognizes the potential influence of background factors on behavioral, normative and control beliefs [19]. In childhood fever management, maternal age, education and experience in fever management have been reported to influence knowledge and beliefs [1, 20]. Although there is a volume of literature reporting TPB studies, there is a dearth of literature reporting the determinants of parents' intentions when caring for their child's health. This study begins to address this deficit.

Summary of proposed model

This study tested a conceptual model of parents' intentions to reduce their child's next fever with medications, based on the TPB, by assessing the direct and indirect effects of background factors [education, number of children, health industry experience (education in a health profession or working in a health setting) and child medication behavior] on attitudes, subjective norms, PBC in decision making and intentions. The literature continually reports health professionals' negative attitudes toward fever and reduction of fever with medications [4, 5]; therefore, the influence of working (in any capacity) in a health setting was

explored. Having control over deciding how to manage a febrile child was perceived as control over the behavior, reducing fever with medications. The following hypotheses were tested:

- H_1—attitudes, subjective norms and PBC in decision making will determine intentions.
- H_2—background factors, education, number of children, health industry experience and child medication behavior will determine parents' attitudes, subjective norms and PBC.
- H_3—influences from background factors on intentions will be mediated through attitudes, subjective norms and PBC.

Methods

Study design

A cross-sectional self-report survey was conducted.

Sample

A convenient sample of parents of children aged between 6 months and 5 years living in Queensland, Australia, was recruited. In an attempt to recruit a representative sample, three recruitment methods were employed: (i) advertising, (ii) face-to-face and (iii) snowball. Recruitment methods are explained in detail in Walsh *et al*. [21]. Overall, 48.4% were recruited through advertising, 26.4% face-to-face and 24.4% by snowball methods. Recruitment of 0.8% was unknown.

Sample size

Sample size was determined for another aspect of this study by *estimating the population proportion with specified absolute precision* [22, see pp.1–2, 25]. Two key items were used, 'temperature parents considered fever' and 'temperature they generally administered medications' and a sample of 384 deemed necessary. This is explained in detail in Walsh *et al*. [21]. For structural equation modeling (SEM), sample size is dependent on the number of parameters and should be >200 with complex models requiring larger samples [23]. The sample of 384 was considered sufficient.

Data collection

Advertisements were placed in freely accessible parenting magazines in metropolitan and outer metropolitan areas; in Playgroup Queensland monthly online newsletter and quarterly magazine and with Family Day Care providers throughout Queensland. Interested parents contacted the researcher by phone (49.6%) or e-mail (50.4%). Face-to-face recruitment was conducted in metropolitan and outer metropolitan childcare centers, kindergartens and preschools where parents were informed of the study through posters and individual letters. Snowball recruitment occurred through respondents and researcher networks. All interested parents received a survey package containing a letter of introduction, plain language information sheet, a questionnaire and reply paid envelope.

Instrument

Item development was guided by a qualitative elicitation study conducted to identify parents' salient beliefs and current practices and referents [24]. Items targeted attitudes, subjective norms, PBC and intentions. All items were measured on seven-point Likert scales ranging from 1 to 7.

- Intentions were measured on three items; 'I will try to reduce my child's next fever with medication'; 'The next time my child has a fever I intend to reduce my child's fever with medication' (extremely likely to extremely unlikely) and 'I plan to reduce my child's next fever with medication' (strongly agree to strongly disagree).
- Attitudes toward reducing fever with medications were measured on three items. Behavioral beliefs targeted were 'Reducing my child's fever with medication will ''prevent my child from being harmed by the fever''; ''reduce discomfort caused by fever'' and ''prevent a febrile convulsion'' (extremely likely to extremely unlikely)'. Outcome evaluations for behavioral beliefs were explored through three items such as 'reducing

my child's fever with medication is' (extremely bad to extremely good).

- Subjective norms were measured on multiple items to ensure construct reliability [25]. Items were developed for all significant referents identified through the elicitation study: husband/partner, mothers, friends and doctors [24]. Normative belief items for each referent were 'When my child has a fever my … thinks I should reduce the fever with medication' (extremely likely to extremely unlikely). Parents' motivation to comply with referents perceived beliefs were assessed through item such as 'Generally speaking when you are caring for your child with a fever how much do you do what your … thinks you should do' (not at all to very much).
- PBC explored parents' controllability in fever management decision making. Items targeting controllability were 'When my child has a fever I decide how to manage it' and 'Deciding whether or not to use medications to reduce my child's fever is completely up to me' (strongly agree to strongly disagree). Self-efficacy or capability was explored through 'For me to decide by myself how to manage my child's fever makes it' and 'For me to decide by myself whether I manage my child's fever with medications is' (much easier to manage fever to more difficult to manage fever).

Educational level, number of children and health industry experience were addressed by individual items; child medication behavior by two items: 'My child takes medications easily when they have a fever' and 'I am confident I will be able to reduce my child's next fever with medications' (strongly agree to strongly disagree).

Instrument validity and reliability

In accordance with Ajzen's recommendations when developing an instrument, direct measures were used to increase item and TPB construct reliability [26]. Face and content validity of instrument items were determined by an expert panel (six), a psychologist, pediatric nurse researcher, clinical pediatric nurses and nurse academics and a pilot study with nine parents of children aged 6 months to 5 years and included a pediatric nurse, nurse academic and participants from an earlier semi-structured discussion study [24, 27]. Instructions and items were deemed clear and easily understood. Constructs are determined theoretically in TPB studies [25]. Convergent and discriminant validity were verified by confirmatory factor analysis (CFA) [28].

Data analysis

Data were entered into SPSS Version 14 [29] checked for entry error using Data Entry Builder [30] and negatively worded items reverse coded to ensure a higher score indicated a more evidence-based response. Items were then prepared in accordance with the TPB [13, 31]. Prior to analysis, data were screened for missing values. Cases with >10% missing data were excluded leaving a sample of 391. Remaining surveys had <0.002% of data missing completely at random [32] and were replaced theoretically. Data were transformed using square root transformation to correct positive skewness and leptokurtic kurtosis following exploration for univariate normality [33]. Background variables were checked for frequency and distribution. CFA and SEM were conducted using AMOS 6 [34]; in both models, free parameters were estimated by maximum likelihood. CFA models the relationships between a priori observed items (questionnaire items) and unobserved or latent variables (TPB constructs) and confirms item inclusion in a factor (scale) similarly to factor analysis. SEM models the relationships between the unobserved latent variables and additional observed variables such as background factors, similar to a regression analysis [23]. Cross-sectional studies exploring latent variable (CFA) or measurement models (SEM) are common in TPB literature [28].

Model fit

Fit statistics employed were goodness-of-fit index (GFI) and adjusted goodness-of-fit index (AGFI) with values of 0.90 accepted as good fit. To reduce the probability of Type I and II error comparative fit index (CFI) values >0.95 were accepted as good fit

[35] and root mean square error approximation (RSMEA) <0.06, a badness-of-fit statistic [32, 35]. χ^2, although reported, was not used to determine model fit as χ^2 is sensitive to large sample sizes and assumes multivariate normality [35].

Results

Respondents (n = 391) were 20–52 years, female (97.4%) and in a married/defacto relationship (93.3%). Forty one (10.5%) had a child who had experienced a febrile convulsion. One-third had experience in a health setting. Most had a university education, two or more children, were born in Australia and lived in a major city. See Table I for additional demographic information. Geographical locations and number of children were the only demographic factors significantly influenced by recruitment method. Advertising methods recruited more parents from inner regional areas (F[2,383] = 10.642, $P < 0.001$) than face-to-face or snowball ($P < 0.01$ and $P < 0.01$, respectively). Parents recruited face-to-face (F[2,385] = 6.208, $P < 0.01$) were less likely to have one child than those recruited through advertising ($P < 0.01$) or snowball ($P < 0.01$).

Before presenting the results, it should be noted that parents in this sample reported the temperature they considered to be fever to range from 36.7°C to 40.5°C [mean 38.2°C, standard deviation (SD) 0.6°C] [21]. Most (91.4%) regularly administered medications for temperatures ranging from 37.0 to 40.0°C (mean 38.3°C, SD 0.6°C) believed medications harmful (73.2%) and 35.3% gave medications at too frequent intervals—overdosing their child [2].

An a priori, four-factor independent cluster congeneric measurement model was evaluated to ensure the constructs demonstrated discriminant validity. Some measurement error between normative influences from mother and friends (24.320) was indicated in the covariance portion of the modification indices output. Similar mean scores for these two variables indicate a potential overlap in item content or similar normative influence from mothers and friends [36], so the model was re-specified with the error terms for mother and friends allowed to covary. Table II presents the factor structure of the latent constructs and correlations and descriptive statistics for the indicator variables in the model and Fig. 1 a diagrammatic presentation of the CFA model. The resultant model was found to be a good fit to the data χ^2 (47, n = 391) = 91.069, $P < 0.0001$; GFI 0.964; AGFI 0.940; CFI 0.981 and RSMEA 0.049 [0.034–0.064, 90% confidence interval (CI)]. Indicator variables demonstrated unidimensional loading onto their respective factors. Intercorrelations between the latent constructs ranged from a low −0.10 to a high of 0.73; all factor loadings exceeded 0.37 and were statistically significant at the 0.001 level. Strong relationships were demonstrated between attitudes and intentions and subjective norms and intentions (see Fig. 1). Construct reliability was determined by Cronbach's alpha: attitudes 0.827, subjective norms 0.687, PBC decision making 0.776 and intentions 0.933.

Consistent with the TPB, a structural model hypothesizing a relationship between background factors, theoretical constructs (attitudes, subjective norms and PBC) and intentions was tested. Table III displays the bivariate correlations of the demographics variables and TBP constructs in the model. The model explained 69% of the variance in parents' intentions and was a good statistical fit to the data: χ^2 (101, n = 391) = 196.936, $P < 0.001$; GFI 0.945; AGFI 0.916; CFI 0.967; RMSEA 0.049 (0.039–0.060, 90% CI). All theoretical pathways were significant at the 0.0001 level excepting pathways between attitude and PBC (P = 0.023), subjective norms and PBC (P = 0.959) and PBC and intentions (P = 0.065). There were statistically significant pathways ($P < 0.001$) between some background factors and theoretical constructs, specifically between child medication behavior and norms, attitudes and PBC and between education and PBC. Pathways between health industry experience and subjective norms (P = 0.005) and number of children and PBC (P = 0.003) were significant. A trend toward significance was demonstrated by the pathway between educational level and attitude (P = 0.079). See Fig. 2 for statistically significant pathways in the structural model of intention.

Table I. *Participant demographics n = 391*

Demographic	Total sample, *n* (%)	Advertising, *n* = 189	Face-to-face, *n* = 104	Snowball, *n* = 95
		n (%)	*n* (%)	*n* (%)
Gender				
Female	381 (97.4)	185 (97.9%)	103 (99.0%)	90 (94.7%)
Male	10 (2.6)	4 (2.1%)	1 (1.0%)	5 (5.3%)
Marital status				
Married/partnered	365 (93.3)	175 (92.6%)	98 (94.2%)	89 (93.6%)
Single	16 (4.1)	9 (4.8%)	4 (3.8%)	3 (3.2%)
Separated/divorced	10 (2.6)	5 (2.6%)	2 (1.9%)	3 (3.2%)
Number of children, *n* = 391				
1	113 (28.9)	69 (36.5%)	15 (14.4%)	29 (30.5)
2	202 (51.7)	88 (46.6%)	64 (61.5%)	48 (50.5)
3 or more	76 (19.4)	32 (16.9)	25 (24.0)	18 (18.9)
Highest educational achievement, *n* = 391				
Some/completed secondary school	67 (17.2)	31 (16.4)	15 (14.4)	21 (22.1%)
TAFE certificate/diploma	74 (18.9)	38 (20.1%)	17 (16.3)	18 (18.9%)
Undergraduate degree	157 (40.2)	71 (37.6%)	54 (51.9%)	31 (32.6%)
Postgraduate degree	93 (23.8)	49 (25.9)	18 (17.3%)	25 (26.3%)
Health industry experience				
Yes	125 (32.0)	63 (33.3%)	33 (31.7%)	28 (29.5%)
No	266 (68.0)	126 (66.7%)	71 (68.3%)	67 (70.5%)
Employment status, *n* = 391				
Not at present/on leave	160 (40.9)	23 (12.2%)	15 (14.4%)	22 (23.2%)
Full-time work/student	60 (15.3)	62 (32.8%)	31 (29.8%)	29 (30.5%)
Part-time work/student	123 (31.5)	24 (12.7%)	14 (13.5%)	10 (10.5%)
Casual work	48 (12.3)	80 (42.3%)	44 (42.3%)	34 (35.8%)
Child who had a febrile convulsion, *n* = 388				
Yes	27 (7.0%)	16 (8.5%)	4 (3.8%)	7 (7.4%)
No	361 (93.0%)	173 (91.5%)	100 (96.2%)	88 (92.6%)
Country of birth, *n* = 388				
Australia	316 (81.4)	151 (79.9%)	85 (81.7%)	77 (81.1%)
UK	28 (7.2)	18 (9.5%)	7 (6.7%)	3 (3.2%)
New Zealand	22 (5.7)	11 (5.8%)	4 (3.8%)	7 (7.4%)
Other	22 (5.7)	9 (4.8%)	7 (6.8%)	6 (6.4%)
Husband/partner 's country of birth, *n* = 369				
Australia	280 (75.9)	136 (72.0%)	78 (75.0%)	64 (67.4%)
UK	38 (10.3)	21 (11.1%)	9 (8.7%)	8 (8.4%)
New Zealand	18 (4.9)	6 (3.2%)	4 (3.8%)	8 (8.4%)
Other	33 (8.9)	14 (13.7%)	9 (8.7%)	9 (9.7%)
Geographical location, *n* = 388				
Major city (ARIA[a] 0–0.20)	287 (74.0)	124 (65.6%)	94 (90.4%)	68 (73.1%)
Inner regional area (ARIA 0.21–2.40)	76 (19.6)	53 (28.0%)	10 (9.6%)	12 (12.9%)
Outer regional area (ARIA 2.41–5.90)	17 (4.4)	11 (5.8%)	0 (0.0%)	6 (6.5%)
Remote area (ARIA 9.21–10.53)	7 (1.8)	0 (0.0)	0 (0.0%)	7 (7.5%)
Very remote (ARIA 10.54 and over)	1 (0.3)	1 (0.5%)	0 (0.0%)	0 (0.0%)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Age in years	35.4 (4.8)	34.2 (4.5)	35.2 (4.7)	34.2 (5.1)

TAFE, technical and further education; SD, standard deviation.
[a]ARIA is the Accessibility and Remoteness Index of Australia. Geographical location was determined using respondents' postcode which was initially classified using Delivery Office as per the Australia Post website (2005), then the ARIA and finally the Remoteness Area {Trewin, 2005 #3525}.

Table II. *CFA intercorrelations means and SDs for latent variables; factor structure of latent variables and between indicator items (standard measures) n = 391*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Latent variables																
1. Intentions	1.000															
2. Attitudes	***0.730***[a]	***1***.000														
3. Subjective norms	***0.703***	***0.564***	1.000													
4. PBC decision making	***−0.187***	***−0.157***	***−0.096***	1.000												
Indicator items																
5. Belief_1 harm	0.682	**0.934**[b]	0.527	−0.146	1.000											
6. Belief_2 discomfort	0.565	**0.773**	0.436	−0.121	*0.723*[c]	1.000										
7. Belief_3 febrile convulsions	0.490	**0.671**	0.378	−0.105	*0.627*	*0.519*	1.000									
8. Norm_1 husband/partner	0.492	0.394	**0.700**	−0.067	*0.369*	*0.305*	*0.265*	1.000								
9. Norm_2 Mother	0.260	0.209	**0.370**	−0.036	*0.195*	*0.161*	*0.140*	*0.259*	1.000							
10. Norm_3 friends	0.360	0.289	**0.512**	−0.049	*0.270*	*0.223*	*0.194*	*0.358*	*0.416*	1.000						
11. Norm_4 doctor	0.476	0.382	**0.677**	−0.065	*0.357*	*0.295*	*0.256*	*0.474*	*0.251*	*0.347*	1.000					
12. PBC_DM1 I decide	−0.128	−0.107	−0.066	**0.683**	*−0.100*	*−0.083*	*−0.072*	*−0.046*	*−0.024*	*−0.034*	*−0.044*	1.000				
13. PBC_DM2 deciding is up to me	−0.174	−0.146	−0.089	**0.929**	*−0.136*	*−0.113*	*−0.098*	*−0.062*	*−0.033*	*−0.046*	*−0.060*	*0.635*	1.000			
14. Intention_1 try	**0.876**	0.640	0.616	−0.164	*0.598*	*0.495*	*0.429*	*0.431*	*0.228*	*0.316*	*0.417*	*−0.112*	*−0.152*	*1.000*		
15. Intention_2 intend	**0.933**	0.681	0.656	−0.174	*0.637*	*0.527*	*0.457*	*0.459*	*0.243*	*0.336*	*0.445*	*−0.119*	*−0.162*	*0.818*	1.000	
16. Intention_3 plan	**0.916**	0.669	0.644	−0.171	*0.625*	*0.517*	*0.449*	*0.451*	*0.238*	*0.330*	*0.436*	*−0.117*	*−0.159*	*0.802*	*0.855*	1.000
Mean[d]	4.5410	6.855	12.203	11.728	2.684	2.124	2.046	2.787	3.721	3.518	2.177	5.869	5.860	1.495	1.519	1.526
SD	1.294	2.718	3.296	1.867	1.133	0.931	1.078	1.148	1.288	1.174	0.953	1.000	1.065	0.453	0.454	0.470

SD, standard deviation.
[a]Bolded italics indicate factor intercorrelations.
[b]Bolded intercorrelations indicate theoretical constructs—loading of each indicator item onto its respective factor.
[c]Italics indicate the intercorrelations between indicator items.
[d]Range for intention 1–7 with 1 being a phobic attitude (not based on the latest scientific evidence), phobic normative influence (against evidence-based management) and low level of PBC in decision making and intention to reduce the child's next fever with medications and 7 being an evidence-based attitude, evidence-based norm and high level of PBC in decision making influencing and intention not to reduce their child's next fever with medications.

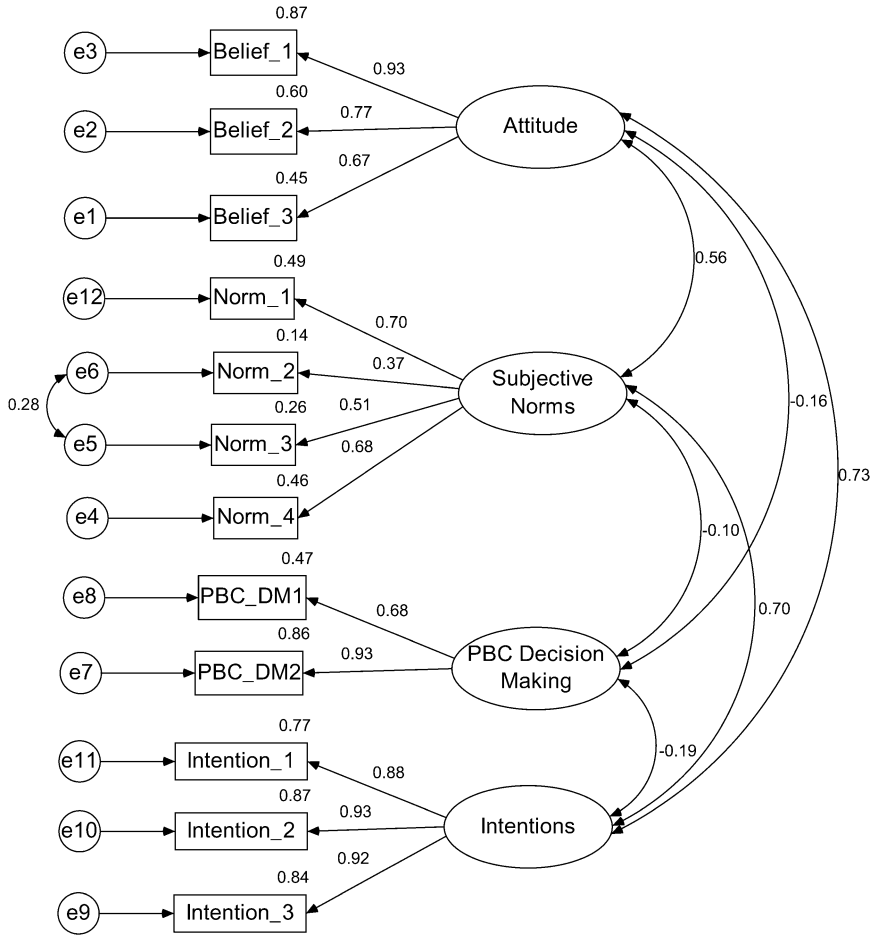

Fig. 1. CFA—all pathways from latent variables to indicator items (standardized β coefficients) were significant at the $P < 0.001$ level. Pathways between latent variables (estimates of correlations between factors—latent variables) were significant at the $P < 0.001$ level excepting the pathway from PBC decision making to intentions ($P = 0.014$), norms ($P = 0.173$) and attitudes ($P = 0.030$). The unique measurement error for each indicator item is also presented. Standardized estimates are presented.

The total effect of attitudes on intentions was strong. Subjective norms had a moderate total effect on intention both directly and indirectly through attitudes. PBC made no significant contribution to intentions. Child medication behavior had a strong effect on all theoretical constructs and a total effect of on intentions mediated through attitudes and PBC. Table IV displays the standardized and unstandardized effects of demographics, attitudes, norms and control on parents' intentions to reduce fever with medications. For example, 70% of the variance in parents reported attitudes (see Fig. 2) was influenced by subjective norms (0.258); child medication behavior (−0.803); education (0.078) and health industry experience (0.039) with the strongest influence from child medication behavior. This indicates that if a child did not take medications easily then parents' attitudes toward reducing fever with medications was more evidence-based—they were less likely to intend to reduce fever with medications. Their intentions were more evidence based.

Table III. *Bivariate correlations for all variables included in the structural equation model*

	1	2	3	4	5	6	7
Demographic variables							
1. Education							
2. Health industry	0.159[a]	—					
3. No. of children	0.077	0.054	—				
Child factors							
4. Child medication behavior	−0.136[a]	−0.021	0.037	—			
TPB constructs							
5. Attitudes	0.174[a]	0.063	−0.015	−0.540[a]	—		
6. Subjective norms	0.100[b]	0.117[b]	0.072	−0.141[a]	0.359[a]	—	
7. PBC decision making	−0.171[a]	0.051	0.150[a]	0.235[a]	−0.131[a]	−0.073	—
8. Intentions	0.134[a]	0.098	−0.024	−0.506[a]	0.646[a]	0.500[a]	−0.166[a]

[a]Correlation significant at the 0.01 level (two tailed).
[b]Correlation significant at the 0.05 level (two tailed).

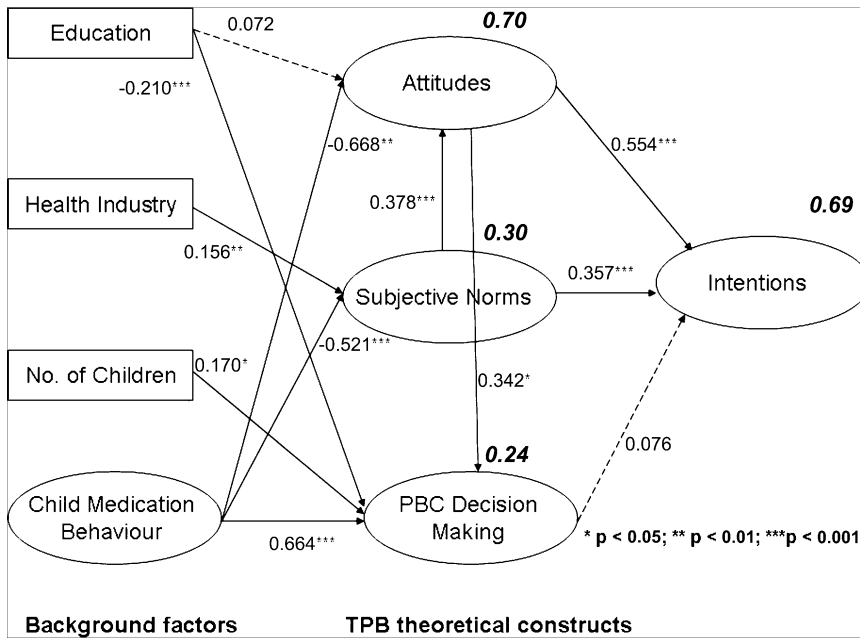

Fig. 2. Structural equation model of the effects of background factors on constructs of the Theory of Planned Behavior and theoretical constructs on parents' intentions to reduce their child's next fever with medications. Significant pathways are represented by a solid line; practical though non-significant pathways by a broken line. Beta weights are in black and the variance explained in each construct is represented in bold italics. Standardized estimates are presented.

There was a strong overall influence on intentions from both attitudes and subjective norms. In the model, 70% of the variance in attitudes was explained by influence from subjective norms, child medication behavior, education and health industry experience (see Fig. 2 and Table IV). Child medication behavior, health industry experience, education and number of children explained 30% of the

Table IV. *Standardized and unstandardized effects of TPB constructs and demographic variables on parents' intentions to reduce their child's next fever with medications*

	Attitude		Subjective norms		PBC decision making		Child medication behavior		Education		No. of children		Health industry	
	St[a]	Unst[b]	St	Unst	St	Unst	St	Unst	St	Unst	St	Unst	St	Unst
Total effects														
Attitudes	[c]	[c]	0.258	0.378	[c]	[c]	−0.803	−01.172	0.078	0.071	0.001	0.001	0.039	0.080
Subjective norms	[c]	[c]	[c]	[c]	[c]	[c]	−0.521	−0.519	0.024	0.015	0.072	0.069	0.156	0.219
PBC decision making	0.421	0.342	0.103	0.123	[c]	[c]	0.329	0.391	−0.177	−0.130	0.170	0.193	0.081	0.136
Intentions	0.522	0.213	0.492	0.295	−0.076	−0.038	−0.655	−0.392	0.065	0.024	0.013	0.008	0.071	0.060
Direct effects														
Attitudes	[c]	[c]	0.258	0.378	[c]	[c]	−0.668	−0.976	0.072	0.065	−0.018	−0.025	−0.001	−0.003
Subjective norms	[c]	[c]	[c]	[c]	[c]	[c]	−0.521	−0.519	0.024	0.015	0.072	0.069	0.156	0.219
PBC decision making	0.421	0.342	−0.005	−0.006	[c]	[c]	0.664	0.790	−0.210	−0.154	0.170	0.193	0.065	0.110
Intentions	0.554	0.226	0.357	0.214	−0.076	−0.038	[c]	[c]	[c]	[c]	[c]	[c]	[c]	[c]
Indirect effects														
Attitudes	[c]	[c]	[c]	[c]	[c]	[c]	−0.134	−0.196	0.006	0.006	0.019	0.026	0.040	0.083
Subjective norms	[c]	[c]	[c]	[c]	[c]	[c]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PBC decision making	[c]	[c]	0.109	0.130	[c]	[c]	−0.335	−0.398	0.033	0.024	0.000	0.000	0.016	0.026
Intentions	−0.032	−0.013	0.135	0.081	[c]	[c]	−0.655	−0.392	0.065	0.024	0.013	0.008	0.071	0.060

[a]Standardized effects.
[b]Unstandardized effects.
[c]No pathway between the two variables.

variance in subjective norms. Variance in PBC (24%) was explained by their attitudes, subjective norms, child medication behavior, education, number of children and health industry experience. Of note, child medication behavior demonstrated the strongest overall influence on intentions.

Hypothesis 1 was partially supported. Background factors, education, number of children, health industry experience and child medication behavior determined parents' subjective norms and PBC. However, number of children was not a determinant of attitude. Hypothesis 2 was partially supported. Although attitudes and subjective norms predicted intentions, PBC did not. Hypothesis 3 was supported. The influence of background factors was mediated by attitudes, subjective norms and PBC.

Discussion

Parents intended to reduce their child's next fever with medications. Sixty-nine percent of the variance in intentions was explained by attitudes, subjective norms, PBC and background factors with strongest influences from attitudes, subjective norms and child medication compliance. Although parents reported controlling fever management decisions made it easier to manage fever, PBC was not a significant predictor of intentions. Findings highlight the complex nature of parents' decision making in childhood fever management. The model makes an important contribution to fever management literature and provides guidance for education programs to address parents' overuse of medications in fever management. The discussion will focus on interpreting the findings and implications for practice.

Interpreting the findings

Childhood fever management is an emotional issue motivated by fear of harmful outcomes [1, 37]. Reducing fever reduces concerns about harmful outcomes from fever [38]. The influence from multiple variables on decision making and intentions indicates this to be a complex issue. Parents with evidence-based beliefs about and attitudes toward reducing fever with antipyretics perceived others expected fever to be reduced with antipyretics, had a child compliant with medication administration and reported stronger perceptions of control over managing fever when they made the fever management decisions. Those who had lower education levels or more than one child also reported believing that having control over fever management decisions made it easier to manage fever.

Attitudes were not based on scientific evidence. Parents who believed others expected fever to be reduced with medications; had a child who took medications easily or higher educational attainment reported non-scientifically based attitudes (e.g. fever should be reduced with medications). Interestingly, when children did not take medications easily, parents' beliefs and attitudes were more evidence based indicating a positive influence from this experience. This indicates that when children refuse medications and do not encounter harmful outcomes from fever, parents' attitudes were challenged. This supports Ajzen's [19] attitude change theory. Although attitudes are not easy to change, personal experience with new information is a strong contributor to attitude change and this is confirmed by the scientifically based attitudes of parents of non-compliant children.

Subjective norms, indicating beliefs that husband/partner and doctors expected fever reduced with medications, were phobic and not supportive of evidence-based intentions. Normative influences from husband/partner, fever should be reduced with medications, are understandable. Husbands/partners of those who participated would share the concerns and protective role of the parent who participated. Media reports of dire outcomes from missed diagnoses of febrile illnesses and higher parental awareness of, and concern about, febrile convulsions possibly contribute to husband/partner norms [1, 3]. The strong influence of phobic norms implies that parents of ill children need to be perceived as caring appropriately for their child, particularly by their husband/partner and doctor. Despite this, the strong influence of child medication behaviors on attitudes and subjective norms suggests that experience has a significant role in not only attitude formation [19] but also

in the influence of subjective norms. This implies that when a febrile child refused medications and there were no adverse consequences, parents' attitudes became more positive—their child was not harmed. The importance of this finding needs further investigation; it may be the key to reducing parents' fever phobia.

Perceived phobic normative influences from doctors are potentially damaging particularly in relation to the percentage of parents who alternate and overdose with antipyretics [3, 5–7]. Evidence of the beneficial role of endotoxic fever in humans and animals have been available for decades; although fever places substantial demands on the body through increased metabolic demands, it is an adaptive response [10, 11]. In western countries, parents learn to care for febrile children from doctors [1, 3]; parents should then be cognizant with the latest scientific evidence that mild to moderate fever is beneficial [39] and hold evidence-based attitudes. Practices and intentions based on beliefs of doctors' expectations of practice should reflect the latest scientific evidence. This was not so. When parents' non-scientific normative beliefs about doctors' expectations are considered in association with literature reports that doctors recommend parents reduce fever with medications and alternate medications to normalize fever; the findings are not surprising [5, 40].

Doctors were identified as a significant referent in the elicitation study [24]; however, other health professionals, nurses, pharmacists and their assistants advise parents on fever management strategies. The role of health professionals is substantiated by the impact that health industry experience had on norms. These parents reported stronger normative influences to reduce fever with medications than those without this experience. Phobic norms influenced attitudes, making them reflect phobic beliefs and increased parents' intentions to reduce fever with medications.

PBC was positive and conceptually congruent. Parents believed that deciding how to manage fever and whether to use medications made it easier to manage fever. However, PBC made no significant contribution to their intentions to reduce fevers. Their perception of control was significantly influenced by phobic attitudes, compliant child medication behavior, fewer children and lower educational level. This, when considered with the high reported rate of medication use [2, 5] and reports of seeking medical advice for high, persistent and recurrent fever [3, 41, 42] indicates parents encounter difficulties when attempting to control or normalize fever. Parents' intended to reduce fever irrespective of their perception of control over making fever management decisions. This indicates that education programs targeting decision making will alter neither intentions nor behavior. Areas that have been identified in this study to be targeted through educational programs are phobic attitudes and perceived phobic normative influences and providing parents with positive experiences with childhood fevers that have not been reduced by medications.

Child medication behavior made the strongest overall contribution to intentions mediated through attitudes, subjective norms and PBC. This has particular importance and implies that parents' past experiences with fever play a role in their subjective norms and attitudes. Parents are aware that it can be difficult to manage fever. Therefore, despite intending to manage fever they are cognizant, they may not be successful irrespective of whether they make fever management decisions and, or, their child was amenable to taking medications. This could explain the non-significant influence of PBC on intention and requires further exploration.

The influence of child medication behavior on medication use has not been previously explored. Findings highlight the role of positive experiences and have implications for parent education. When children refusing medications were unharmed during febrile episodes, parents received new information about fever and fever management supporting Ajzen's theory on attitude change [19]. Parents' direct personal experiences, in this case no negative outcome from fever, produced more evidence-based attitudes. The phobic attitudes of the parents, whose febrile children who were reluctant to take medications, were regularly challenged. In light of the rapid increase in the practice of alternating medications [1, 5, 9], the influence of negative child

medication behaviors on parents' intentions to use medications is a key finding.

Generally, attitudes or PBC are not the strongest predictors on intention [19]; in this study, attitude and subjective norms were. The strong normative influence found in this study is important, particularly when health professional recommendations and use of medications for fever management is considered [40, 43, 44]. In this study, the strength of normative influences on intention could explain the lack of influence from PBC decision making.

Strengths and limitations

Identification of predictors of parents' fever management intentions through a major attitude–behavior theory provides vital information for health teaching. Instrument face and content validity were confirmed by an expert panel and a pilot study [27]. Construct and discriminant validity and construct reliability were confirmed through CFA [45]. Multiple recruitment methods were employed to recruit a heterogeneous sample to reduce recruitment bias [27, 46] and improve generalizability of the findings.

Despite this, generalization of the findings must be considered with the following in mind. The sample was self-selected, mostly female, lived in a major city and had a university degree. Parents of children with epilepsy or children with a history of febrile convulsions were overrepresented twice the general population level. Those recruited through advertising were less likely to come from a major city and have fewer children.

Educational level, access to health services and gender may influence findings. Gender influences were, however, incorporated into subjective norms. Parents living in rural areas may practice differently due to limited access to health services. Some of the findings, although not statistically significant in this study, warrant further investigation due to the smaller number of parents with secondary and non-university further education.

Practice implications

The identification of determinants of intentions to reduce fever, phobic attitudes, perceived phobic norms and medication compliance provides an excellent basis for the development, implementation and evaluation of educational interventions. Findings indicate an urgent need for change. New evidence-based beliefs about the benefits of fever and use of medications for pain rather than fever need to be introduced. Parents with evidence-based beliefs about fever who are knowledgeable about when to seek medical advice will be more confident in their management of childhood fevers.

This study identified the complexity of caring for a febrile child. The impact of child medication behavior experience on attitudes, subjective norms and intentions indicates a need for parents to learn to care for a febrile child before having a negative experience, preferably before the first febrile episode. Ideally, parents will learn to manage fever before the first immunizations are due not only preparing them to care for their child following immunization but also ensuring that most parents receive education before their child's first febrile episode.

The strong normative influence to reduce fever to prevent harm indicates the need for broad-based community education with husband/partner included in programs. The influence from doctors highlights the need for all health professionals advising parents on childhood fever management, update their knowledge and encourage parents to practice in an evidence-based manner by preventing dehydration and keeping the child comfortable [39]. Parents want to do what is best for their child, and their beliefs that reducing fever prevents harm confirms this. They seek medical advice to access the doctors' clinical skill and ability to discuss what is wrong with their child, they want to know how to manage the child at home [47–49]. Doctors must respect parents' integrity without fearing evidence-based information will harm their therapeutic relationship. Health professionals, as a group, need to address this issue and assist parents to realize the benefits of fever. Care of a febrile child should focus on the child's well-being rather than temperature, using analgesics to relieve pain associated with febrile illnesses, and not reducing fevers under 39.0°C unless associated with discomfort or pain [39, 50].

In TPB, community-based education programs persuasive communication in, for example, newspapers, flyers, television, face-to-face discussions or observational modeling are effective [25]. Additionally, the development of implementation intentions, a specific plan identifying how the next fever will be managed, when medications will be administered and how the febrile child will be managed have been proven effective in TPB programs dealing with complex behavioral issues [25, 51].

Conclusions

Parents intended to reduce fever, even temperatures <38.0°C (mean 38.2°C), with medications. Intentions were determined by phobic attitudes and subjective norms and child compliance with medication administration. The significant contribution of subjective norms to attitudes and intention highlights the strength of parents' perceived normative influence to reduce fever on their practices. Given that parents believe doctors expect fever should be reduced identifies the need for health professionals to upgrade their knowledge. The contribution of child medication behaviors to intention requires further exploration, as medications are parents' preferred method of fever management. Although education, number of children and health industry experience had some influence on attitudes, subjective norms and PBC decision making, they did not influence intentions either significantly or practically. Parents' intentions and the determinants of intentions highlight the need for education of both parents and health professionals to reduce the strong normative influence to reduce fever with medications which in turn influences decision making and intentions. It is imperative that health professionals consistently provide evidence-based information about fever management not only to parents of young children but also to the community as a whole.

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Conflict of interest statement

None declared.

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