Using three-phase theory-based formative research to explore healthy eating in Australian truck drivers.

Caitlin Vayro¹ and Kyra Hamilton^{1, a}

¹School of Applied Psychology, Griffith University. 176 Messines Ridge Road, Mt Gravatt, QLD 4122, Australia.

^aCorresponding author: Kyra Hamilton, School of Applied Psychology, Griffith University, 176 Messines Ridge Road, Mt Gravatt, QLD 4122.

Email: kyra.hamilton@griffith.edu.au; Phone: [+61 \(0\)7 3735 3334](tel:+61737353334); Facsimile: [+61 \(0\)7 3735 3388](tel:+61737353388)

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Abstract

In Australia, fruit and vegetable consumption is lower than recommended while discretionary foods (i.e., foods high in fat, sugar, and salt) are eaten in excess. Long-haul truck drivers are a group at risk of unhealthy eating but have received limited attention in the health literature. We aimed to examine long-haul truck drivers eating decisions in order to develop theory-based and empirically-driven health messages to improve their healthy food choices. Drawing on the Theory of Planned Behavior, three-phased formative research was conducted using self-report surveys. Phase 1 ($N = 30$, $M_{\text{age}}=39.53$, $SD_{\text{age}}=10.72$) identified modal salient beliefs about fruit and vegetable (FV) consumption and discretionary choices (DC). There were nine behavioral and seven normative beliefs elicited for both FV and DC; while nine and five control beliefs were elicited for FV and DC, respectively. Phase 2 ($N = 148$, $M_{\text{age}}=44.23$, $SD_{\text{age}}=12.08$) adopted a prospective design with one week follow-up to examine the predictors of FV and DC intentions and behavior. A variety of behavioral and control beliefs were predictive of FV and DC intentions and behavior. Normative beliefs were predictive of FV intention and behavior and DC intentions only. Phase 3 ($N = 20$, $M_{\text{age}}=46.9$, $SD_{\text{age}}=12.85$) elicited the reasons why each belief is held/solutions to negative beliefs, that could be used as health messages. In total, 40 reasons/solutions were identified: 26 for FV and 14 for DC. In summary, we found that specific behavioral, normative and control beliefs influenced FV and DC eating decisions. These results have implications for truck driver's health and provide formative research to inform future interventions to improve the food choices of a unique group who are at risk of unhealthy eating behaviors.

Keywords: beliefs, truck drivers, theory planned behavior, healthy eating, diet

Introduction

Only 5.5% of Australians consume fruit and vegetables (FV) as recommended by the Australian dietary guidelines; this figure drops to 4.5% for Australian men (Australian Bureau of Statistics, 2013). Consuming an unhealthy diet has many negative health consequences including increased risk of chronic diseases (Pelletier, Dion, Slovinec-D'Angelo, & Reid, 2004). Consuming a healthy diet, on the other hand, provides many health benefits and may also reduce consumption of unhealthy, nutrient-poor foods (Fulton, Cardwell, McKinley, & Woodside, 2011; He, Nowson, Lucas, & MacGregor, 2007). In Australia, the NHMRC (2013) has devised evidence-based guidelines for healthy eating (NHMRC, 2013; Williams, 2010). These include the recommendation that individuals “Enjoy plenty of vegetables including different types and colours, and legumes/beans, and enjoy fruit” (pg. 36; ‘FV intake’) and “Limit intake of foods containing saturated fat, added salt, added sugars...” (pg. 67 ‘DC’). For adults aged over 19 years, these guidelines recommend five serves of vegetables and two serves of fruit each day, while limiting discretionary food to one serve or less each day (NHMRC, 2013).

Despite the benefits of consuming a nutritionally balanced diet, the NHMRC (2013) recognises that certain groups are at higher risk of unhealthy eating. These groups include people of lower socioeconomic status and males, with factors such as employment, education, and lifestyle implicated as contributing to these groups being at risk (NHMRC, 2013). Other risk factors associated with unhealthy eating include the availability of facilities that may influence food preparation, as well as affordability of and access to nutritious foods (NHMRC, 2013). One group that encompasses many of these risk factors and has received limited attention in the health literature is truck drivers; in particular, long-haul truck drivers.

In Australia long-haul truck drivers (henceforth referred to as truck drivers) may be defined as people driving a ≥ 12 tonne truck, who drive in excess of 200km in one working

period and where the working period is predominately spent driving (Stevenson, et al., 2010). It is suggested that truck stops, often the main source for truck drivers to access meals, offer limited healthy food options, like FV, while offering a large selection of discretionary foods (Whitfield-Jacobson, Prawitz, & Lukaszuk, 2007). Given the risk factors previously identified, it is not surprising that the minimal literature has found truck drivers to be an unhealthy population, especially regarding their diet and weight (Apostolopoulos, Sonmez, Shattell, Gonzales, & Fehrenbacher, 2013; Whitfield-Jacobson, Prawitz, & Lukaszuk, 2007). Thus, there is a need for research to explore factors that influence the eating decisions of Australian truck drivers.

Some environmental factors influencing the diet of truck drivers have been identified (e.g. availability, parking regulations, and work schedules); however, no research has applied a systematic examination using a theory-based approach to investigate this issue from an individual perspective (Apostolopoulos, Sonmez, Shattell, Gonzales, & Fehrenbacher, 2013; Whitfield-Jacobson, Prawitz, & Lukaszuk, 2007). Adopting such an approach is important to determine the cognitive mechanisms underpinning the eating behavior for this at-risk group (Epton, et al., 2014). Furthermore, taking a rigorous, targeted approach allows the development of theory-based and empirically-driven health messages that can inform future interventions to curb unhealthy eating and improve healthy eating of Australia's truck drivers.

Theory of Planned Behavior: Behavioral, Normative, and Control Beliefs

The theory of planned behavior (TPB) is a social cognition model of behavioral decision-making that asserts attitudes towards behavior, subjective norms, and perceived behavioral control (PBC) predict intention, with intention and PBC predicting behavior (Ajzen, 1991). The attitude construct refers to judgements concerning the valence of behavior (Ajzen, 1991). Subjective norms are an individuals' perceptions of pressure toward a

behavior exerted by important individuals or groups (Ajzen, 1991). PBC is the perceived difficulty (or ease) of performing a behavior and the extent that performing the behavior is under volitional control (Ajzen, 1991).

Despite recent criticisms of the TPB (see Sniehotta, Pesseau & Araujo-Soares, 2014), meta-analytic studies support the use of the model in predicting people's health and social behaviors (e.g. Armitage & Conner, 2001; McEachan, Conner, Taylor, & Lawton, 2011). Armitage and Conner's (2001) meta-analysis of the TPB accounted for 39% of the variance in intentions and 27% of the variance in behavior. McEachan et al.'s (2011) meta-analysis reported that, averaged across health behaviors, the TPB accounted for 44% and 19% for intention and behavior, respectively. Furthermore, they found that eating behaviors are one of the most well-predicted behaviors using the TPB with the model accounting for 50% of the variation in intentions and 21% of the variance in eating behavior (McEachan et.al., 2011). Thus, the model provided a strong framework for understanding human behavior (Ajzen, 2014; Armitage, 2014). An important feature of the TPB is the hypothesis that the antecedents of attitude, subjective norms, and PBC are corresponding salient behavioral, normative, and control beliefs, respectively, reflecting the systems of beliefs that underpin an individual's intention and behavior (Ajzen, 1991). Ajzen (1991) proposes that the factors that predict intention and behaviors (the TPB constructs) are the sum of the related beliefs, with beliefs being based on available information (perceptions) such as information regarding environmental or biological factors. These beliefs can be used to develop theoretically- and empirically-based health messages that are relevant to the target group (Epton et al., 2014).

According to Ajzen (1991), behavioral beliefs are beliefs about a behavior relating to outcomes, positive or negative, and underpin an individual's attitudes. Normative beliefs refer to whether groups or individuals that are important approve or disapprove of a specified

behavior, and underpin subjective norms. Control beliefs are beliefs regarding factors that facilitate or prevent undertaking a given behavior, and underpin PBC. Ajzen (2014) recommends that formative research to elicit beliefs from a sample of the target population is a necessary first step to understand and change behavior, which resonates with the PRECEDE-PROCEED model (Green & Kreuter, 2005).

A number of studies have used the TPB framework to elicit beliefs for a range of health behaviors (Cowie & Hamilton, 2014; French, Wade, & Farmer, 2013; Hamilton & Schmidt, 2013; Hamilton, et al., 2012; Kane, Hyde, & Hamilton, 2014; Sainsbury & Mullan, 2011; Scott, Eves, Hoppe, & French, 2009). Previous research regarding eating behavior beliefs has found that behavioral beliefs generally relate to health consequences either positive or negative, normative beliefs are often found to be supportive of healthy eating with minimal to no perceived disapproval, and control beliefs generally suggest there are many factors that facilitate and prevent healthy eating (Middlestadt, et al., 2012; Sainsbury & Mullan, 2011; Spinks & Hamilton, 2015). Although providing a useful target, it is not always the case that beliefs are utilised as the basis for subsequent intervention (Ajzen, 2014; Hardeman et al., 2002; Webb, Sniehotta, & Michie, 2010). The TPB can be used as a theoretical basis for the creation of health messages as well as utilizing belief-based research to test the theoretical utility of the TPB (Epton, et al., 2014; Fishbein & Ajzen, 2011).

Formative research on beliefs, is necessary for depth of understanding of the behavior in a given population (Ajzen, 2014; Epton, et al., 2014). In addition, formative research eliciting reasons for (or solutions to) beliefs predictive of intentions and behavior allows for clear message creation specific to the sample and behavior. In sum, the evidence suggests that theoretically-based formative research, including investigating modal salient beliefs, can provide a strong theoretical framework for developing interventions for health behavior change.

The Current Research

Given the dearth of literature on truck drivers' eating behavior and research indicating that unhealthy eating habits are a real issue for this population, the importance of increasing healthy and limiting unhealthy eating is paramount. Drawing on the work of Epton et al. (2014), the current study adopted a three-phase approach with the aim of exploring beliefs to aid in developing health messages that are theoretically-based and empirically-derived. The target behaviors were 1) consuming FV and 2) limiting DC as per the Australian Dietary Guidelines (NHMRC, 2013). The approach adopted in the current research follows the 'three-phase' approach used by Epton et al. (2014). First, modal salient beliefs (behavioral, normative, and control) are elicited from a sample of the target population using individual surveys asking open-ended questions (Phase 1). The strength of relationships between these beliefs and intention and behavior is then tested in a larger sample of the population (Phase 2). The third phase elicits the reasons for (positive), or solutions to (negative), the beliefs that independently predict intentions and behavior (from a sample of the target population). This three phase approach has been suggested as a basis for health message creation, and Phases 1 and 2 are similar to the recommendations for eliciting TPB-based beliefs, with this research having the addition of eliciting reasons and solutions to the positive and negative beliefs that are predictive of intention and/or behavior individually (Spinks & Hamilton, 2015; Sutton, et al., 2003; von Haften, Fishbein, Kasprzyk, & Montano, 2001).

Method

Participants

Participants were males, over the age of 19 years, who drove a truck ≥ 12 tonne (including trailer) where work time was predominately spent driving with at least 200 km travelled in one work period (Stevenson, et al., 2010; The Department of Transport and Main Roads, 2014). Participants in all phases were recruited through face-to-face contact at truck

events (e.g. OztruckinTV Car and Truck Show and Shine) or online utilising social networking websites (e.g. Facebook; *Trans-help Online Roadhouse*). Participants were approached with information about the research and given a link/information sheet if they were willing to know more or complete the survey. Although each phase had separate recruitment, using the aforementioned methods, the phases were not exclusive. However, as data collection was anonymous across the study phases the overlap of participants in each phase is not known.

Design

The study was approved by the University Human Research Ethics Committee. All questionnaires in all phases were completed in a setting and at a time convenient for the participant. To ensure informed consent, an information sheet was provided with all surveys and it was made explicit that consent is implied with return of a completed questionnaire. Two target behaviors were investigated: (1) FV intake: eat FV following the recommended serves each day in the next week, and (2) limit DC: limit consumption of discretionary foods to a maximum of 0-1 serves each day in the next week, as recommended by the Australian Dietary Guidelines for adult males (NHMRC, 2013). The TACT principle (Ajzen & Fishbein, 1977) was utilised for creating the target behaviors: target (FV intake, and DC), action (eating and limiting, respectively), context (not specified, all contexts of eating) and time (each day in the next week). The applicable dietary guidelines were provided in each survey to inform participants of the guidelines relevant to each target behavior and examples of one serve were included to aid response.

Phase 1: Belief Elicitation

Method. In Phase 1, 30 truck drivers ranging in age from 19 to 56 years old ($M_{\text{age}}=39.53$, $SD_{\text{age}}=10.72$) were recruited. The average weight and BMI of participants was 108.2kg ($SD=29.8$) and 32.90 ($SD=8.47$), respectively. Further, of the 30 participants one

completed primary school (3.3%), three had some high school education (10%), 10 had junior high school education (grade 10; 33.3%), four senior high school (13.3%), and 9 had a tafe/trade qualification (30%), one had a university degree (6.7%), and one participant had incomplete education data. The study sample did not differ from the larger, Phase 2 sample on demographics such as age, ethnicity, years driving a truck or type of driving work ($p > .05$). The study consisted of a self-report survey (paper-based, $n = 4$, 13.33% or online, $n = 26$, 86.66%) to elicit modal salient beliefs that underpin truck drivers' attitudes, subjective norm, and perceived behavioral control with regards to the target behaviors. Questions outlined by Fishbein and Ajzen (1975) were used to elicit 1) behavioral beliefs (positive or negative outcomes and any other associations made, e.g., "Please list what you believe are the advantages of limiting your consumption of discretionary choices (sometimes foods) to a maximum of 0-1 serves each day in the next week"); 2) normative beliefs (approval or disapproval of significant others or groups that come to mind, e.g., "Please list any individuals or groups of people who would approve of you eating fruit and vegetables following the recommended serves every day in the next week"); and 3) control beliefs (facilitative and preventative factors as well as any other issues associated, e.g., "Please write down any circumstances or factors what might help or encourage you to eat fruit and vegetables following the recommended serves every day in the next week") with regards to the target behaviors. Thematic content analysis was performed on the elicited beliefs with a cut off of 15% (4 participants) adopted for a belief to be classed as a modal salient belief. The current approach was similar to Epton et al. (2014) and ensured a wide range of salient behavioral, normative, and control beliefs were included in Phase 2. The beliefs were coded by the first author with the second author examining the themes and corresponding codes to ensure reliability of coding. The first and second authors reviewed, refined, and named all themes.

Results. The average number of beliefs elicited per person was 16.07 ($SD=7.33$) and the range (4-36). The modal salient beliefs (see Table 1 and 2), were included in the survey for Phase 2 baseline. Nine behavioral (e.g., improve my digestive health), seven normative (e.g., parents), and nine control (e.g., lack of time) modal salient beliefs were identified relating to FV intake. Nine behavioral (e.g., save money), seven normative (e.g., other family), and five control (e.g., limited healthy options at truck stops) modal salient beliefs were identified regarding limiting DC.

Phase 2: Belief Correlation

Method. In Phase 2, 148 truck drivers ranging in age from 19 to 78 years ($M_{age}=44.23$, $SD_{age}=12.08$) were recruited (Phase 2 baseline), with 74 (50%) participants completing the follow-up survey one week later (Phase 2 follow up). Analyses with regards to attrition found no significant differences. Participants resided across all states of Australia, with Queensland ($n=69$, 46.6%) being most represented. The average weight and BMI of participants was 101.15kg ($SD=25.43$) and 31.31 ($SD=7.79$), respectively. Further, of the 148 participants one completed primary school (.7%), 33 completed some high school (22.3%), 40 completed junior high school (grade 10; 27%), 28 completed senior high school (18.9%), and 39 had a tafe/trade qualification (26.4%) and 7 a university degree (4.7%). The past behavior of the truck drivers was measured (using a single item) with an average of 3.79 ($SD=2.23$) days in the past week that FV were eaten following recommended serves, The average number of days where DC were limited was 3.61 ($SD=2.33$). Code identifiers were provided by participants at baseline and asked for at the onset of the follow up.

Baseline. Participants completed a paper-based ($n=88$, 59.46%) or online ($n=60$, 40.54%) survey. The questionnaire counterbalanced presentation of FV and DC sections to reduce possible order effects. The strength of intention for performing the target behaviors was measured with three questions (e.g., “Do you agree that in the next week: I plan to [target

behavior] every day?”, scored [1] *strongly disagree* to [7] *strongly agree*.) The reliabilities were .92 and .90 for FV intake and limiting DC, respectively. For the belief-based items, each of the modal salient beliefs elicited in Phase 1 were included. The behavioral belief items asked participants “How likely is it that the following would occur as a result of you [target behavior] each day in the next week” [behavioral belief], scored on a 7-point Likert scale ([1] *extremely unlikely* to [7] *extremely likely*). Normative beliefs assessed the seven beliefs elicited in Phase 1 as referents for the survey item (e.g., “How likely is it that the following people or groups of people would think that you should [target behavior] each day in the next week?” Friends/mates, scored [1] *extremely unlikely* to [7] *extremely likely*). Control beliefs assessed each of the modal salient control beliefs elicited in Phase 1. Participants were asked “How likely is it that the following factors would prevent you from [target behavior] each day in the next week?”, [control belief] scored [1] *extremely unlikely* to [7] *extremely likely*. Although Fishbein and Ajzen (1975) advocate multiplicative terms, it has been indicated that use of traditional value items in belief measurement provides limited additional utility; thus, in the interest of the time pressed population only the behavioral, normative and control expectancy beliefs were measured (Gagne & Godin, 2000).

Follow up. Behavior was measured one week subsequent using three standard TPB questions (e.g., “In the previous week, how often did you [target behavior] every day?”, scored [1] *never* to [7] *very often*). To increase the validity of the FV TPB-based behavior measure, participants were asked open questions (e.g., “How many serves of tinned/bottled fruit did you eat each day averaged over the past week?”) from the South West Queensland Nutrition Survey (Southern Area Population Health Services, 2006)¹. The reliabilities of TPB-based behavior measures were .94 and .98 for FV intake and limiting DC, respectively.

¹ The TPB-based measure of FV correlated significantly with FV intake as assessed by the South West Queensland Nutrition Survey, $r(73)=.56$, $p<.001$.

Results. Phase 2 examined the modal salient beliefs (elicited from Phase 1) in relation to truck drivers' intentions and behavior toward FV intake and DC, to determine the key beliefs for each target behavior. The key beliefs regarding FV intake and limiting DC were identified using similar processes to those outlined by Epton et al. (2014) and von Haeften et al. (2001). First, Pearson product-moment correlation matrices were calculated to determine which beliefs significantly correlated with intentions and behavior for each of the target behaviors. The beliefs that were found to be significantly related to intention and/or behavior were then analysed with stepwise multiple regressions (with pairwise deletion) based on behavioral, normative, and control beliefs separately predicting intention and behavior for each target behavior (12 regressions in total). Although the TPB does not specify a direct relationship between behavioral or normative beliefs with behavior, the relationship between the beliefs and behavior provide evidence to support the utility of targeting beliefs in interventions on behavior (see Sutton, 2002; Weinstein, 2007). The stepwise approach was adopted based on guidelines as per von Haeften et al. (2001) to determine which beliefs significantly and independently predict intention and behavior. Furthermore, Field (2013) indicated that stepwise regression is suitable for exploratory modelling, as in the current research.

FV intentions. All of the nine behavioral beliefs ($r = -.19$ to $.49$), five of seven normative beliefs ($r = .11$ to $.30$), and four of nine control beliefs ($r = -.33$ to $-.11$) were significantly correlated with intention (see Table 1). Multiple regression analyses (see Table 3) revealed two behavioral beliefs ($R^2 = .32$; improve my digestive health, $\beta = .48$, 95% CI = $[.40, .76]$ and loss of time from food preparation, $\beta = -.29$, 95% CI = $[-.35, -.11]$); two normative belief ($R^2 = .12$; wife/partner, $\beta = .22$, 95% CI = $[.02, .41]$ and other family members, $\beta = .20$, 95% CI = $[.01, .41]$); and one control belief ($R^2 = .11$; lack of organisation, $\beta = -.33$, 95% CI = $[-.44, -.15]$) as key beliefs related to FV intentions. FV intake intentions

significantly correlated with behavior ($r = .59, p < .001$).

FV behavior. Six of 10 behavioral beliefs ($r = -.24$ to $.39$), one of seven normative beliefs ($r = .04$ to $.26$), and six of nine control beliefs ($r = -.41$ to $-.07$) were significantly correlated with behavior (see Table 1). Multiple regression analyses (see Table 3) revealed two behavioral beliefs ($R^2 = .20$; reduce my level of fatigue, $\beta = .39$, 95% CI = $[.22, .77]$ and loss of time from food preparation, $\beta = -.22$, 95% CI = $[-.44, -.01]$); one normative belief ($R^2 = .06$; other family members, $\beta = .26$, 95% CI = $[.04, .63]$); and one control belief ($R^2 = .17$; lack of organisation, $\beta = -.41$, 95% CI = $[-.68, -.20]$) as key beliefs related to FV intake behavior.

DC intentions. Eight of nine behavioral beliefs ($r = -.34$ to $.26$), one of seven normative beliefs ($r = -.01$ to $.27$), and one of five control beliefs ($r = -.20$ to $.13$) were significantly correlated with intention (see Table 2). Multiple regression analyses (see Table 4) revealed two behavioral beliefs ($R^2 = .19$; better nutritional intake as lower salt, sugar and fat intake, $\beta = .29$, 95% CI = $[.11, .42]$ and remain hungry, $\beta = -.36$, 95% CI = $[-.44, -.17]$); one normative belief ($R^2 = .07$; friends/mates, $\beta = .27$, 95% CI = $[.08, .35]$); and one control belief ($R^2 = .04$; inconvenience, $\beta = -.20$, 95% CI = $[-.29, -.03]$) as key beliefs related to DC intentions. Intentions significantly correlated with DC behavior ($r = .38, p < .001$).

DC behavior. One of nine behavioral beliefs ($r = -.25$ to $-.08$), none of seven normative beliefs ($r = -.21$ to $.07$), and one of five control beliefs relating to behavior ($r = -.33$ to $-.07$) were significantly correlated with behavior (see Table 2). Multiple regression analyses (see Table 4) revealed one behavioral belief ($R^2 = .06$; remain hungry, $\beta = -.25$, 95% CI = $[-.62, -.03]$) and one control belief ($R^2 = .11$, inconvenience, $\beta = -.33$, 95% CI = $[-.66, -.12]$) as key beliefs related to DC behavior.

Table 1

Mean and Standard Deviations of Behavioral, Normative, and Control Beliefs and Correlations with Intentions and Behavior for Fruit and Vegetable Intake

Beliefs	M	SD	Intention r	Behavior r
Behavioral beliefs				
Improve my physical health	5.88	1.40	.44***	.29*
Improve my energy level	5.91	1.31	.40***	.31**
Reduce my level of fatigue	5.53	1.66	.43***	.39**
Ensure adequate nutritional intake	5.93	1.35	.44***	.30*
Improve my digestive health	5.87	1.39	.49***	.38**
Too much food wastage	3.42	2.02	-.19*	-.10
Less enjoyment of food taste	2.98	1.90	-.28**	-.01
Loss of time from food preparation	4.30	2.10	-.31***	-.22*
Inconvenient to store food	4.14	2.12	-.22*	-.12
Normative beliefs				
Wife/partner	5.78	1.67	.30**	.14
Parents	5.40	1.80	.15	.16
Kids	5.34	1.76	.18*	.11
Other family members	5.41	1.63	.29**	.26*
Friends/mates	4.86	1.65	.22*	.21
Healthcare professionals	5.97	1.50	.11	.04
Employer	4.85	1.93	.23**	.20
Control beliefs				
Lack of time	4.20	2.20	-.16	-.34**
Limited availability	4.59	2.19	-.16	-.20
Inconvenient	4.12	2.03	-.19*	-.25*
Lack of quality	4.30	2.11	-.12	-.25*
Lack of food storage	4.25	2.18	-.15	-.30*
Cost	3.47	2.03	-.20*	-.18
Lack of organisation	4.10	1.93	-.33***	-.41**
Lack of taste	3.08	1.98	-.20*	-.07
Lack of access	4.30	2.26	-.11	-.26*

*p<.05 **p<.01 ***p<.001

Mean and Standard Deviations of Behavioral, Normative, and Control Beliefs and Correlations with Intentions and Behavior for Discretionary Choices

Beliefs	M	SD	Intention r	Behavior r
Behavioral beliefs				
Lose/control my weight	4.66	2.11	.17	-.09
Better nutritional intake	5.34	1.70	.26**	-.16
Improve my physical health	5.30	1.80	.22*	-.18
Improve my energy levels	5.39	1.63	.23**	-.21
Save money	5.22	1.89	.19*	-.08
Remain hungry	3.74	1.94	-.34***	-.25*
Limits my selection of food choices	4.15	1.92	-.24**	-.10
Unsatisfied due to limiting tasty foods	3.89	1.86	-.24**	-.22
Feel more tired/fatigued (no sugar hit)	3.68	1.93	-.21*	-.23
Normative beliefs				
Wife/partner	5.26	2.07	.11	-.16
Parents	4.78	2.27	-.01	-.16
Kids	4.72	2.09	-.01	-.12
Other family members	4.72	2.00	.08	-.02
Friends/mates	4.45	2.05	.27**	.07
Healthcare professionals	5.26	2.07	.06	-.21
Employer	4.23	2.12	.20	-.03
Control beliefs				
Cost	3.69	2.23	-.15	-.12
Limited healthy options at truck stops	5.39	1.92	.13	-.07
Lack of access to healthy foods	5.19	2.00	.12	-.12
Lack of time	4.57	2.01	-.05	-.14
Inconvenience	4.22	2.10	-.20*	-.33**

*p<.05 **p<.01

Table 3

Fruit and vegetables: summary of results from Phase 1, 2, 3

	Phase 1: Belief elicitation		Phase 2: Behavior prediction (β s)		Phase 3: Reasons/solution elicitation	
	Category	n=30	Intention n=129	Behavior n=71	n=20	
Behavioral beliefs	Advantages	Digestive health (6)	.48***		What are the three most important digestive health improvements of eating fruit and vegetables?	Better metabolism (4) Improved regularity (16) Improved internal health (5) Energy (3) Less illness (3)
		Reduce my level of fatigue (5)		.39**	What are three important reasons eating fruit and vegetables would reduce your fatigue level?	Better nutrition (11) Sustained/balanced energy (11) Natural sugar (5) Healthier (7)
	Disadvantages	Loss of time from food preparation (5)	-.30***	-.22*	What are three ways to prepare fruit and vegetables to help you not lose time?	Prepare before leave home (20) Cook vegetables in the truck (3) Buy fruit and vegetables prepared (10) Eat fruit and vegetables raw (5)
Normative beliefs	Approve	Wife (10)	.30*		What are the reasons your wife/partner would want you to eat fruit and vegetables?	Health (12) Live longer (7) Lose weight (7) Eating better (4) Cost (3)
		Other family members (18)	.20*	.26*	What are the reasons your other family members would want you to eat fruit and vegetables?	Health (15) Live longer (7) Energy (5)
Control beliefs	Preventative	Lack of organisation (6)	-.33***	-.41***	What are three ways you can be more organised to eat fruit and vegetables?	Buy when grocery shopping (6) Planning (5) Have pre-prepared (14) Store in truck (8) Accessible (3)

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4

Discretionary choices: summary of results from Phase 1, 2, 3

Phase 1: Belief elicitation			Phase 2: Behavior prediction (β s)		Phase 3: Reasons/solution elicitation	
	Category	n=30	Intention n=128	Behavior n=74		n=20
Behavioral beliefs	Advantages	Better nutritional intake (due to lower salt, sugar and fat intake) (9)	.29***		What are the ways that limiting discretionary choices lead to better nutritional intake (due to lower salt, sugar and fat)?	Less unhealthy foods (12) Eating healthy instead (13)
	Disadvantages	Remain hungry (7)	-.36***	-.25*	What are ways that limiting discretionary choices will not leave you feeling hungry?	Drink water (4) Eat healthy instead (20)
Normative beliefs	Approve	Friend/mates (5)	.27**		What are the reasons your friends/mates would want you to limit discretionary choices?	Live longer (4) Health and wellbeing (9) Less risk of diabetes (3) Energy to go out (3) Weight loss (5) Want the best for me (4)
Control beliefs	Preventative	Inconvenience (8)	-.20**	-.33**	What are the ways to limit discretionary choices conveniently?	Prepare and take healthy food (8) Don't buy unhealthy foods (7) Reduce access (so not tempted) (8) Increase healthy food at truck stops (8)

*p<.05, **<.01, ***<.001

Phase 3: Reason/Solution Elicitation

Method. In Phase 3, 20 participants ranging in age from 21 to 67 years ($M_{\text{age}} = 46.90$, $SD_{\text{age}} = 12.85$) were recruited from Phase 2 participants that had indicated consent for further contact and also consented to participate in Phase 3. The average weight and BMI of participants was 96.2kg ($SD=25.4$) and 29.64 ($SD=6.03$), respectively. Further, of the 20 participants, two completed some high school (10%), four completed junior high school (grade 10; 20%), three completed senior high school (15 %), and 11 had a tafe/trade qualification (55%).

The beliefs shown as significant predictors of the truck drivers' intentions and behaviors for the two target behaviors were utilised in Phase 3 to gain qualitative data relating to reasoning behind (or solutions to negative) beliefs held. This was completed following procedures as outlined by Epton et al. (2014). Specifically, participants were asked to provide up to three reasons underlying each positive predictive belief (e.g., What are the important reasons eating fruit and vegetables would reduce your fatigue level?) with solutions elicited for negative beliefs (e.g., "What are the ways to limit discretionary choices conveniently?").

Results. Using the key beliefs found to be significant predictors of intentions and behavior for each target behavior in Phase 2, salient reasons/solutions were elicited and analysed using content analysis with a 15% cut off using the same process as the thematic content analysis for Phase 1. Overall, 40 reasons/solutions were identified: FV intake (26) and DC (14). Response themes were supported by between three and 20 participants for both FV intake and DC. For example, two reasons (solutions, due to negative belief) were identified for 'what are ways that limiting DC will not leave you feeling hungry': drink water and eat healthy instead. See Tables 3 and 4 for full details of the modal reasons for FV intake and DC, respectively

Discussion

The aim of the current research was to adopt formative research procedures to explore the beliefs of truck drivers utilizing a TPB framework, and the underpinning reasons/solutions to determine salient beliefs and reasons/solutions in order to create theoretically-based and empirically-derived health messages for truck drivers regarding healthy eating. This investigation is important due to truck drivers being at risk for unhealthy eating yet there is a dearth of literature regarding this group's eating decisions. Overall, a range of behavioral, normative, and control beliefs predicted truck drivers' intention and/or behavior for eating FV and limiting DC, and from these predictive beliefs, a variety of modal salient reasons/solutions were elicited. This formative process provides rich explanatory information which may be used to understand, and thus ultimately improve, the eating decisions of truck drivers in Australia (Epton et al., 2014).

First, several behavioral beliefs (positive and negative valence) emerged as significant predictors of truck drivers' eating decisions. For FV, positive and negative beliefs are held with each having influence on intention and behavior. The truck drivers indicated that they believe 'digestive health' and 'reducing my level of fatigue' were two positive outcomes associated with eating the recommended serves of FV as dictated by the Australian Dietary Guidelines (NHMRC, 2013). The positive outcomes associated with FV intake, similarly seen in other health behavior studies such as physical activity (Hamilton & White, 2010) and low-fat diet (White, Terry, Troup, & Rempel, 2007), indicates that performance of health behaviors may be impacted by the salience of the advantages for one's health. On the other hand, in the current study the truck drivers indicated that a 'loss of time from food preparation' is a negative outcome associated with eating FV, impacting both their intention to eat FV and FV intake behavior. This finding suggests that if truck drivers believe they will lose time from preparing food it is likely this belief will thwart their intention to eat FV,

which in turn, will influence their actual consumption of FV. The findings are concurrent with the literature on truck drivers suggesting they are a time-poor population (Passey, et al., 2014). Healthy eating requires one to not only know what foods are beneficial for one's health but to also have access to these healthy foods (at truck stops or all aspects of preparing for oneself), which may explain why FV intake is low in truck drivers (Passey, et al., 2014). DC intention and behavior (limiting), on the other hand, were both predicted by a negative behavioral belief 'remain hungry'. This finding indicates that drivers believe that if they restrict intake of discretionary foods they will not be satiated. The literature generally indicates that discretionary foods are highly accessible to truck drivers, while healthy foods are not (due to being unavailable, expensive or unappetising etc.; Whitfield-Jacobson, Prawitz, & Lukaszuk, 2007). With reason, then, if truck drivers perceive that healthy foods are not accessible they will eat discretionary options to reduce hunger. Overall, and across both FV intake and limiting DC, the results suggest that evaluation of behavioral advantages and disadvantages is part of the decision-making process for these important eating behaviors in truck drivers, influencing what trucks drivers intend to eat as well as what they actually eat.

Normative beliefs were found to impact on truck drivers' eating decisions, especially from those important others who approve of the target behaviors. Wives'/partners' and other family members (family not including parents) approval was influential and indicated as important for FV intake intentions, with other family members' approval salient for FV intake intentions and behavior. The results for FV intake in the current study are consistent with previous research that has found, in a range of healthy eating behaviors, that family members' expectations are an important influence on people's food choices (Spinks & Hamilton, 2015; White et al., 2007). Furthermore, the finding of normative influences on food intake decisions is supported by a qualitative study by Passey et al. (2014) where truck

drivers indicated that family in general are an important reason to be healthy. For DC, the influence from friends, in particular, was important for intending to limit DC with no important normative influence emerging for behavior. Friends have been found to influence dietary behaviors related to weight control, suggesting that social influence is exerted in close relationships (Spinks & Hamilton, 2015; White et al., 2007). The results for normative influences of FV and DC suggest that, in line with Clemens, Thombs, Olds and Gordon (2008), proximal normative influences are more predictive of behavior than distal influences (e.g., health professionals).

Finally, a range of control beliefs were elicited, with the key predictive beliefs relating to factors that prevent the target behaviors. For FV intake, the preventative belief 'lack of organisation' was predictive of both intention and behavior and suggests that those truck drivers who are more organised will be more likely to intend to and actually consume FV as per the recommendations. Thus, increasing the organisation skills of truck drivers may help to increase their healthy eating behaviors. The preventative control belief 'inconvenience' also predicted DC, predicting intention and behavior. For truck drivers, convenience factors are important in informing their decisions to limit DC.

The current study also elicited the reasons/solutions underpinning each of these key beliefs, including components of positive beliefs (reasons) and how to circumvent negative beliefs (solutions). Many reasons/solutions were obtained for the target behaviors with the positive reasons generally regarding promoting good health and wellbeing, and are consistent with the findings of other belief and reason studies (i.e. Epton et al., 2014). These positive reasons, such as better metabolism or because their wife/partner would want them to live longer, indicate that there are benefits to healthy eating that could be used to potentially increase behavior. The circumventing solutions given for the negative beliefs, however, were more varied across domains and related more directly to each specific belief, with many

suggestions given on how one could act to counter the belief. Considering the belief that one will not be left feeling hungry if reducing DC, the truck drivers indicated they could either drink water or eat more healthy food instead. The reasons/solutions elicited can be translated into health messages to be used in persuasive communication with the target population.

Application of Findings

The current study supports adopting a belief and reason elicitation process advocated by Epton, et al. (2014) for the development of theory-based and empirically-driven health messages. A range of beliefs were elicited providing insight into specific factors that influence intentions and behavior. The varied influences on the target behaviors imply that many factors may impact the target behaviors, and as such, interventions to promote healthy eating among truck drivers may benefit from taking a multi-faceted approach, which may also include environmental changes. Furthermore, eliciting reasons underlying (or solutions to) beliefs is a useful process as it targets multiple influential factors, and enhances knowledge about the behavior for the target group, which ultimately, can assist in the development of more effective health messages.

Recent work by Michie et al. (2013) has proposed a taxonomy of behavior change techniques that can assist researchers to adopt specific strategies to change behavior. Taken together, such strategies can be applied to the key beliefs to help modify them, and thus, ultimately change truck drivers eating behaviors. For example, persuasive arguments could be posed to make truck drivers challenge the negative beliefs as outweighing the positive beliefs toward eating FV and limiting DC. For example, “Your wife would want you to eat FV to live longer”. It should be noted that although the approach adopted in the current study provides the necessary formative evidence to create health messages, it does not provide information on the most effective intervention strategies to implement to change the identified beliefs. The suggestion made above is simply an example of a technique that could

be adopted. The behavior change taxonomy does not provide specification of which technique would be suitable to use to target individual beliefs, with a range of techniques being applicable, dependent on the belief. Pilot or feasibility testing of the behavior change techniques and mode of delivery for the specific population would give preliminary evidence of how suitable a technique may be for each specific belief.

Strengths and Limitations

The current research is, to the authors' knowledge, the first study to systematically investigate eating behavior beliefs among Australian long-haul truck drivers, a group at risk of unhealthy eating. This research is beneficial as it not only corroborates previous literature suggesting that truck drivers are at risk of poor health, but also provides a strong theoretical basis to understanding the beliefs underlying truck drivers' eating behavior. Identifying the reasons that support these beliefs (or solutions to counter negative beliefs) will, in turn, inform the creation of health messages to change such behavior.

The current study, however, is not without its limitations. First, the findings should be considered in light of the relatively small sample size, especially for Phase 2 Wave 2 due to attrition. It should be noted, however, that this group is a difficult cohort to target and other studies researching such an at-risk population have recruited similar sample sizes (Whitfield-Jacobson, Prawitz, & Lukaszuk, 2007). The use of self-report measures may also have been a limitation in the current research. Self-report can lead individuals to respond in a way that is more socially desirable but not necessarily a true reflection of their thoughts and behavior. Additional measures were included in the current study to try to curb this effect. For example, the inclusion of a food frequency questionnaire (FFQ) provided a way to strengthen validity of the behavior measure. The FFQ also has the benefit of not deterring participants to respond due to the effort involved; suggested as a limitation of more objective measures of food intake such as a weighted food recall (Kristjansdottir, Andersen, Haraldsdottir, de Almeida,

& Thorsdottir, 2006). A final point of note is that some beliefs identified in the current study relate to environmental factors. Such factors were not directly measured and only the perception of environmental factors was considered. Exploring, more objectively, the environmental factors that relate to truck drivers' eating behaviors in future research may be useful because it can provide rich alternative information for use in designing comprehensive interventions (Michie, van Stralen, & West, 2011). This additional information would be beneficial as it may allow accurate targeting of various additional levels and factors (e.g., context) in interventions (Davis, Campbell, Hildon, Hobbs, & Michie, 2014).

Conclusion

The aim of the current research was to identify the key beliefs underpinning truck drivers' FV and DC intentions and behavior. The use of the TPB belief-based framework helped to provide insight into factors that influence truck drivers' eating decisions. Furthermore, the beliefs elicited provide rich information that can assist the development of more effective interventions for this at-risk group. Overall, a range of behavioral, approving normative, and preventative control beliefs emerged as potential influences of FV and DC intentions and behaviors of truck drivers. Given the importance of interventions to produce effective behavior change, using the knowledge gained from this formative research may lead to improvements in truck drivers' diets, and ultimately, their health.

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