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Can personal values help to manage workers' occupational safety and health behaviour?

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Abstract

Finding innovative and effective ways of improving construction workers' occupational safety and health behaviour is a challenge for implementers of behavioural-based safety (BBS) programmes. Whilst innate antecedents of behaviour could hold the key, limited research has explored the potential effect of innate triggers of behaviour such as personal values. In order to address this gap, this study presents findings from two exploratory inquiries (in UK & Thailand) into the influence of workers personal values on occupational safety and health motivation (OSHM). Both inquiries employed surveys of construction workers on project sites. The UK and Thailand surveys yielded 55 and 83 responses respectively. Through the use of factor analysis and multiple regression modelling, it was found from both surveys that various dimensions of higher-order personal values have statistically significant relationships with different dimensions of OSHM. For instance, in the Thai study self-transcendence and conservation values were positively related to identified OSHM and intrinsic OSHM respectively, while self-enhancement value was positively related to introjected OSHM. In the UK survey, intrinsic and identified motivation scales loaded as one dimension (autonomous motivation) which was positively related to self-transcendence. Overall, the findings from the different national contexts provide some evidence of the predictive effect of personal values on OSHM. The findings thus begin to emphasise the need for the consideration of workers personal values in the design/development and implementation of BBS interventions.

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1. Introduction

Occupational safety and health (OSH) in construction is a major concern as construction continues to be very hazardous [1]. According to Shin et al. [2], about 88% of all industrial accidents are caused by unsafe worker behaviours with the remaining 12% caused by the physical environment and other restrictions. In recognition of the contribution of worker behaviour/acts to unwanted OSH outcomes, there has been a growing emphasis on behavioural-based safety (BBS) programmes. BBS programmes are based on the principle of identifying and promoting safe behaviour and attitudes among individual workers [3]. Consequently, an understanding of the potent antecedents of OSH behaviour is important. However, BBS interventions have taken limited cognisance of intrinsic human factors that could affect behaviour such as human values [4]. Drawing on studies in psychology that have shown significant relationships between human values and behaviours [5], Manu et al. [4] argued for studies into the role of human values in BBS. In line with this, this study particularly examined the relationship between workers personal values and occupational safety and health motivation (OSHM) in construction. The next section reviews literature on human values and OSHM towards the development of a research framework. Subsequently the research methodology applied in the study is outlined. The ensuing research findings, their discussion and concluding remarks are then presented.

2. Literature review

2.1. Human Values

According to Kluckhohn [6] “A value is a conception, explicit or implicit, distinctive of an individual or characteristic of a group, of the desirable, which influences the selection from available modes, means, and ends of action”. Schwartz proposed a more expansive view of values, referring to it “as desirable, trans-situational goals, varying in importance that serve as guiding principles in people’s lives” [7]. Schwartz [5] proposed ten basic values shown in Table 1.

Table 1: Definitions of the Basic Structure of Values [5]

Values	Description	PVQ scale Items
<i>Openness to change</i>	<i>Independence of thought, action and feelings</i>	
Self-direction	The desire to be free from external control or constraints on one’s thoughts or actions.	2 items e.g. Thinking up new ideas and being creative is important to me. I like to do things in my own original way.
Stimulation	Seeking arousal by participating in exciting, new, and challenging activities.	2 items e.g. I like surprises and I am always looking for new things to do. I think it is important to do a lot of different things in life.
Hedonism	Pursuing pleasurable experiences, especially sensual gratification.	2 items e.g. Having a good time is important to me. I like to “spoil” myself.
<i>Self-enhancement</i>	<i>Interests in relation to success and dominance over others</i>	
Achievement	Wanting to be competent and to be recognized for one’s accomplishments.	2 items e.g. It is very important to me to show my abilities. I want people to admire what I do.
Power	Desire to exert control over people and resources.	2 items e.g. It is important to me to be rich. I want to have a lot of money and expensive things.
<i>Conservation</i>	<i>Order, self-restriction and preservation</i>	
Security	Desire to avoid danger or instability.	2 items e.g. It is important to me to live in secure surroundings. I avoid anything that might endanger my safety.
Conformity	Need to avoid violations of social norms and expectations.	2 items e.g. I believe that people should do what they are told. I think people should follow rules at all times, even when no one is watching.
Tradition	Accepting the established patterns of thought and behaviour that reflect one’s culture.	2 items e.g. Tradition is important to me. I try to follow the customs handed down by my religion or my family.
<i>Self-transcendence</i>	<i>Welfare and interests of others</i>	
Benevolence	Desire to promote the welfare of people with whom one has frequent personal contact.	2 items e.g. It is very important to me to help the people around me. I want to care for their well-being.
Universalism	Desire to promote the welfare of all people (including strangers) and a concern for the protection of nature, linked to Maslow’s concept of the self-actualisation	3 items e.g. I think it is important that every person in the world be treated equally. I believe everyone should have equal opportunities in life.

Together, the 10 basic values form four higher-order dimensions: self-enhancement; self-transcendence; openness to change; and conservation [5]. Whereas self-transcendence and conservation values have a social focus (i.e. regulate

how one relates socially to others), self-enhancement and openness to change have a personal focus (i.e. they regulate how one expresses personal interests) [5]. Regarding measurement of the 10 basic values, Schwartz's [5] 21-item portrait values questionnaire (PVQ) can be used. Table 1 shows a description of the 10 values, the number of scale items for each, and an example of the items (based on the PVQ). The table also shows the four high-order values.

2.2. Occupational Safety and Health Motivation (OSHM)

Motivation is described as a set of psychological processes that cause the initiation, direction, intensity and persistence of behaviour [8]. OSHM is thus regarded as a reflection of “an individual's willingness to exert effort to enact safety behaviours and the valence associated with those behaviours” [9]. Fleming [10], developed a framework of safety motivation based on the self-determination theory. Self-determination theory asserts that individuals are motivated to perform behaviours as a result of a variety of intrinsic as well as extrinsic antecedents [8]. Fleming [10] proposed five dimensions of safety motivation: amotivation; introjected motivation; external motivation; identified motivation; and intrinsic motivation. Fleming [10] further developed a 16-item scale to measure these dimensions. Table 2 shows a description of the five dimensions, the number of scale items for each dimension, and an example of the scale items.

Table 2: Safety motivation [10]

Motivation	Description
Amotivation	No reasons for motivation. [4-items e.g. I don't because it doesn't make a difference whether I work safely or not.]
External	Motivated as a result of positive or negative consequences of safety. [3 items e.g. In order to avoid being criticised by others (e.g. supervisors, colleagues, family and clients).]
Introjected	Feeling of guilt, shame or self-worth dependent on safety behaviour. [3 items e.g. Because otherwise I will feel guilty.]
Identified*	Safety behaviour based on an understanding of importance or value of working safely. [3 items e.g. Because putting effort into working safely is important to me.]
Intrinsic*	General interest and joy derived from behaving safely. [3 items e.g. Because I enjoy working safely.]

Notes: * These constitute autonomous motivation (i.e. self-directed motivation)

3. The Research Framework

In order to guide the exploration of potential linkages between workers' personal values and OSHM, a loosely coupled research framework (i.e. without specific hypotheses about the nature of the relationship) was developed. Drawing on the above literature review, the framework (Figure 1) unifies the two main constructs involved in the study (i.e. human values and OSHM) with the broad proposition that human values will be related to OSHM.



Fig. 1. Conceptual framework for personal values and OSHM relationship

4. Research Methodology

A survey was adopted for this study. Due to the cross-cultural relevance of human values [5], insights regarding the manifestation of values-OSHM relationship in different national/cultural contexts was deemed important. Therefore construction workers on project sites in different contexts (i.e. UK, a developed European country, and Thailand, an emerging Asian country) were surveyed. A questionnaire was designed based on Schwartz's [5] PVQ and Fleming's [10] self-determined safety motivation framework. Personal values were measured using a 21-item scale and OSHM was measured using a 16-item scale. The questionnaire also included the following demographic information: respondent role, years of experience in role, years of experience in construction, and age. The questionnaire was originally designed in English for the UK survey and subsequently translated into the Thai language for the Thailand survey. For the UK survey, the questionnaire was administered on two construction sites in Bristol.

For the Thailand survey, the questionnaire was administered on 11 construction sites in two locations: Khon Kaen and Bangkok. The UK and Thailand surveys yielded 55 and 83 useable responses respectively. IBM SPSS 23 was used for descriptive statistical analyses as well as Exploratory Factor Analysis (EFA) and ordinary least square (OLS) multiple linear regression (MLR).

5. Results

The results are presented below under three main sections: demographic information; personal values and OSHM; and effect of workers' personal values on OSHM.

5.1. Demographic information

The roles of the UK survey respondents were: labourer (5.5%); bricklayer/plasterer/tiler (3.6%); mechanical & electrical operative (9.1%); roofer (0.0%); carpenter (5.5%); steel erector/fabricator/welder (3.6%); plumber (29.1%); cladder (1.8%); ground worker (7.3%); scaffolder (0.0%); machine or vehicle operative (5.5%); steel/bar fixer (1.8%); and other role (25.5%). The other roles included: dry lining operative (1), window installation operative (1), trainee construction manager (1), site/construction manager (7), quantity surveyor (1), unspecified role (1), and planner (1). The Mean years of experience in role is 12.50 (standard deviation = 9.509). The Mean years of experience in the construction is 14.25 (standard deviation = 9.688). Mean age is 36.04 (standard deviation = 9.819). Regarding the Thailand survey the respondents' role were: labourer (34.9%); bricklayer/plasterer/tiler (20.5%); mechanical & electrical operative (16.9%); roofer (3.6%); carpenter (3.6%); steel erector/fabricator/welder (3.6%); plumber (3.6%); cladder (2.4%); ground worker (1.2%); scaffolder (1.2%); machine or vehicle operative (1.2%); steel/bar fixer (1.2%); and other role (6.0%). The other roles included storekeeper (2), foreman (1), fire alarm installation operative (1), and site administration personnel (1). The Mean years of experience in role is 7.787 (standard deviation = 6.638). The Mean years of experience in the construction is 8.606 (standard deviation = 6.634). Mean age is 41.27 (standard deviation = 12.186).

5.2. Personal values and OSHM

EFA was conducted on the personal values scales and the OSHM scales to examine the dimensionality and reliability of the scales. Principal component analysis (PCA) with varimax rotation was used. Tables 3 to 6 show the results of the EFA for the UK and Thailand surveys.

Table 3: EFA – Personal Values (UK survey)

Scale Items	Communalities	Dimensions			
		Social Focus-Self Transcendence (SFST)	Personal Focus-Openness to Change 1 (PFOC1)	Social Focus-Conservation (SFC)	Personal Focus-Openness to Change 2 (PFOC2)
3_Universalism	.737	.845			
18_Benevolence	.738	.750			
16_Conformity	.644	.746			
19_Universalism	.719	.689			
12_Benevolence	.475	.512			
15_Stimulation	.772		.859		
21_Hedonism	.756		.784		
10_Hedonism	.683		.718		
7_Conformity	.753			.840	
14_Security	.786			.835	
1_SelfDirection	.774				.826
13_Achievement	.737				.710
Eigen value		4.752	1.589	1.202	1.031
Variance explained		39.604	13.243	10.021	8.590
Scale's Cronbach alpha		0.823	0.792	0.762	0.446

Notes: Extraction Method: Principal Component Analysis. Rotation Method: Varimax.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.729. Variance explained by 4 factors: 71.458%

Bartlett's Test of Sphericity: Chi-Square = 241.362 (df = 66), $p < 0.001$

Factor loading below 0.5 have been suppressed

Table 4: EFA – OSHM (UK Survey)

Scale Items	Communalities	Dimensions			
		Intrinsic-Identified Motivation (Autonomous motivation)	Amotivation	Introjected Motivation	External Motivation
16_Intrinsic3	.854	.908			
13_Identified3	.810	.872			
15_Intrinsic2	.764	.841			
12_Identified2	.824	.814			
11_Identified1	.838	.781			
14_Intrinsic1	.674	.780			
3_Amotivation3	.895		.923		
2_Amotivation2	.894		.914		
1_Amotivation1	.816		.901		
4_Amotivation4	.850		.857		
9_Introjected_motivation2	.777			.864	
10_Introjected_motivation3	.848			.849	
8_Introjected_motivation1	.663			.763	
5_External_motivation1	.745				.827
6_External_motivation2	.777				.824
7_External_motivation3	.533				.570
Eigen value		5.318	4.152	2.021	1.069
Variance explained		33.239	25.948	12.633	6.683
Scale's Cronbach alpha		0.924	0.944	0.845	0.762

Notes: Extraction Method: Principal Component Analysis. Rotation Method: Varimax.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.746. Variance explained by 4 factors: 78.503%

Bartlett's Test of Sphericity: Chi-Square = 682.211 (df =120), $p < 0.001$

Factor loading below 0.5 have been suppressed

Table 5: EFA – Personal Values (Thailand Survey)

Scale Items	Communalities	Dimensions				
		Social Focus- Conservation (SFC)	Personal Focus- Self Enhancement (PFSE)	Personal Focus- Openness to Change1 (PFOC1)	Personal Focus- Openness to Change2 (PFOC2)	Social Focus-Self Transcendence (SFST)
9_Tradition	.712	.817				
18_Benevolence	.677	.815				
16_Conformity	.602	.729				
8_Universalism	.627	.657				
20_Tradition	.599	.569				
2_Power	.629		.776			
4_Achievement	.550		.697			
1_SelfDirection	.601		.596			
6_Stimulation	.848			.894		
15_Stimulation	.821			.883		
11_Self Direction	.695				.807	
10_Hedonism	.709				.797	
19_Universalism	.730					.821
7_Conformity	.680					.516
Eigen value		3.558	1.913	1.693	1.208	1.108
Variance explained		25.412	13.662	12.090	8.627	7.916
Scale's Cronbach alpha		0.803	0.544	0.772	0.526	.345

Notes: Extraction Method: Principal Component Analysis. Rotation Method: Varimax.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.706. Variance explained by 5 factors:

67.709%

Bartlett's Test of Sphericity: Chi-Square = 303.272 (df =91), $p < 0.001$

Factor loading below 0.5 have been suppressed

Regarding the UK survey, 12 of the 21 items in Schwartz's PVQ loaded meaningfully unto four personal values dimensions. One of the sub-scales for the four dimensions had a Cronbach's alpha below the threshold of 0.7 [11].

The low reliability could stem from the low number of scale items (i.e. 2 items) and not from a conceptual ambiguity of the extracted dimension [12]. For the OSHM, all the 16 items in Fleming’s self-determined safety motivation framework loaded meaningfully unto four OSHM dimensions. All the sub-scales for the four dimensions had a Cronbach’s alpha above the threshold of 0.7. Regarding the Thailand survey, 14 of the 21 items in Schwartz’s [5] PVQ loaded meaningfully unto five personal values dimensions. For OSHM, 15 of the 16 items in Fleming’s [10] self-determined safety motivation framework loaded meaningfully unto five OSHM dimensions. Once again, the low Cronbach’s alpha obtained for the sub-scales for three dimensions of values and two dimensions of OSHM (shown in Tables 5 and 6) could be attributable to the low number of scale items [12].

Table 6: EFA - OSHM (Thailand Survey)

Scale Items	Communalities	Dimensions				
		External Motivation	Intrinsic Motivation	Amotivation	Identified Motivation	Introjected Motivation
5_External_motivation1	.883	.902				
6_External_motivation2	.870	.883				
7_External_motivation3	.751	.833				
15_Intrinsic2	.755		.857			
14_Intrinsic1	.705		.832			
16_Intrinsic3	.585		.616			
2_Amotivation2	.847			.895		
1_Amotivation1	.801			.744		
4_Amotivation4	.686			.561		
11_Identified1	.657				.727	
13_Identified3	.641				.658	
12_Identified2	.665				.647	
10_Introjected_motivation3	.766					.804
9_Introjected_motivation2	.677					.801
8_Introjected_motivation1	.594					.732
	Eigen value	4.858	2.210	1.706	1.114	.996
	Variance explained	32.386	14.733	11.373	7.429	6.637
	Scale’s Cronbach alpha	0.905	0.739	0.809	0.587	.668

Notes: Extraction Method: Principal Component Analysis. Rotation Method: Varimax.
 Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.729. Variance explained by 5 factors: 72.559%
 Bartlett’s Test of Sphericity: Chi-Square = 561.427 (df =105), p < 0.001
 Factor loading below 0.5 have been suppressed

5.3. Effect of workers’ personal values on OSHM

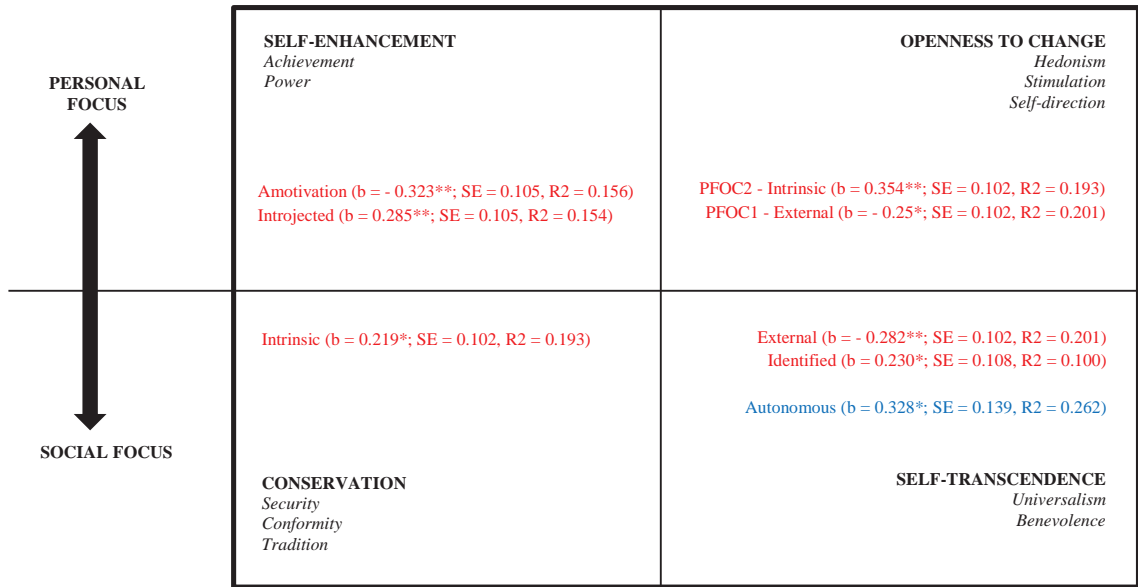
OLS MLR was performed to explore the presence of relationships between the dimensions of personal values and the dimensions of OSHM. The results are summarised in Figure 2. The UK results are shown in blue fonts and the Thailand results in red fonts. The UK results show only one significant relationship between personal values and OSHM, namely between social focus-self-transcendence (SFST) and intrinsic-identified motivation (i.e. autonomous motivation). This suggests that individuals with greater self-transcendence values are more likely to demonstrate autonomous motivation.

The significant positive relationships in the Thailand survey suggest that individuals with greater:

- self-enhancement values are more likely to demonstrate introjected motivation;
- openness to change values are more likely to demonstrate intrinsic motivation;
- conservation values are more likely to demonstrate intrinsic motivation; and
- self-transcendence values are more likely to demonstrate identified motivation.

The significant negative relationships in the Thailand survey suggest that individuals with greater:

- self-enhancement values are less likely to demonstrate amotivation;
- openness to change values are less likely to demonstrate external motivation.
- self-transcendence values are less likely to demonstrate external motivation.



Notes: * p < 0.05; ** p < 0.01; *** p < 0.001. SE = Standard error. UK results are in blue fonts. Thailand results are in red fonts.

Fig. 2. Relationship between personal values and OSHM

6. Discussion

The study being exploratory (i.e. exploring possible links between personal values and OSH motivation) did not test any hypotheses regarding the nature of the relationship between the dimensions of personal values and OSHM. Nevertheless, in the main, the results of the EFA align with Schwartz’s [5] 4 higher-order dimensions of values and Fleming’s [10] self-determined safety motivation framework. The paucity of research on the effect of personal values on OSHM within construction and other fields makes a comparison of the research findings with the extant literature a challenging undertaking. Nevertheless, some of the relationships revealed by the regression analysis lend themselves to some logical explanation. This is considered below.

According to Schwartz’s [5] conservation values, individuals with strong conservation values avoid violation of social norms and they follow customs handed down by religion or family. Where these customs or religion encourage goodness and kindness towards others, individuals with strong conservation values may tend to have a general interest and joy in acting safely as their actions could have harmful consequences for their co-workers. In Thailand, there is strong affirmation of customs (including religion which is predominantly Buddhism [13]) that encourage kindness towards others. This may explain the observed positive relationship between conservation and intrinsic motivation in the Thai survey. Similar to the line of reasoning for the conservation-intrinsic motivation relationship, individuals with strong self-transcendence values, because they seek the welfare of others, may tend to see the importance of working safely (i.e. demonstrate identified motivation) or be self-directed to working safely (i.e. demonstrate autonomous motivation). This could explain the relationship between self-transcendence and identified motivation (observed in the Thailand survey) and self-transcendence and autonomous motivation (observed in the UK survey).

The primary implication that could stem from this study is the recognition/acceptance by OSH managers and implementers of BBS programmes that workers (being ordinary individuals) have a range of personal values that could stimulate desirable OSHM (e.g. identified and intrinsic) and potentially detrimental OSHM (e.g. amotivation and introjected). It would thus be inappropriate to stereotype workers by offering/emphasising a one-size fit all intervention/measure (e.g. a carrot or a stick) in the implementation of BBS programmes. Additionally, understanding the relationship between personal values and OSHM could be useful in flagging early, workers who might be

predisposed to weaker/detrimental forms of OSHM. Whilst there may be an attraction for some companies/employers to use such insight as part of recruitment of workers to their sites, such insight could be put to more beneficial use by providing appropriate induction, training and supervision to workers who by virtue of their personal values may be predisposed to weaker/detrimental forms of OSHM. Considering that BBS is not only applied in construction, but in various industrial sectors (e.g. oil and gas), these implications could be far-reaching in terms of designing and implementing robust BBS programmes in workplaces.

7. Conclusions

In many countries, construction continues to account for a greater proportion of work-related injuries, deaths and illnesses. The contribution of unsafe worker behaviour/acts has given impetus for the implementation of BBS programmes to improve OSH in construction. Whilst personal values could be a vital ingredient for workers' motivation for working safely or unsafely, and consequently their actual OSH behaviour, there is limited empirical evidence regarding the effect of personal values on OSHM. Through two separate inquiries in UK and Thailand, this research has provided some evidence of the potency of personal values in predicting OSHM. The research outcomes could have implications for the implementation of BBS programmes in construction and other sectors e.g. providing training for workers whose values predispose them to detrimental forms of OSHM. The sample sizes of the surveys also dictate that larger surveys are undertaken to further consolidate the insights offered by this study.

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