Developing the “Control Identity” Typology to Create More Effective Testicular Health Promotional Messaging

American Journal of Men's Health
2018, Vol. 12(3) 546–555
© The Author(s) 2015
Reprints and permissions:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/1557988315621143
journals.sagepub.com/home/jmh

**Michael J. Rovito, PhD, CHES, FMHI¹, Thomas F. Gordon, PhD²,
Sarah B. Bass, PhD, MPH³, Joseph DuCette, PhD³,
Ashley M. Tierney, BS¹, and Nicholas Coles, BA⁴**

Abstract

Testicular self-examination (TSE) promotional interventions historically operate without a theoretical framework, which negatively influences their effectiveness. As TSE is critical to the early detection of testicular cancer, this behavior is an essential component to improving overall male well-being. To address this need, the Control Identity personality typology was developed to assist in creating more effective TSE promotional interventions. Four outcome control dispositions were defined a priori based on the dimensions of illusions of control and locus of control. An original 41-item survey, the Control Identity Assessment Scale, was used to assess perceived vulnerability, value of health promotion, and health outcome control among a convenience sample of 300 university males aged 18 to 35 years via a cross-sectional research design. Factor and cluster analyses were employed to extract salient factors in the data and to identify subgroups within the sample. A consistent five-factor structure matrix (~70% explained variance) served as the foundation from which a k-means cluster analysis was employed to classify four types of individuals. Significant differences were detected between clusters on primary variables, including behavioral intentions to conduct TSE. The Control Identity typology aims to provide the needed mechanism for health practitioners to create more effective preventive health messaging to promote TSE. Future implications on employing this typology to segment audiences in order to increase overall effectiveness are offered. Application of this typology could ultimately lead to increasing TSE knowledge retention, behavioral intentions, actual performance, and adherence.

Keywords

men's health, testicular self-examination, health behavior, testicular cancer, Control Identity

Testicular cancer (TCa) is the most prevalent form of cancer among males aged 15 to 40 years (Giannandrea et al., 2013), and is experiencing rising global incidence rates (Powe, Ross, Wilkerson, Brooks, & Cooper, 2007). Over the past four decades, TCa incidence rates have increased by more than 50%, with 15- to 35-year-old males experiencing the largest increase (Walschaerts et al., 2008). Most individuals who develop TCa are younger than the age of 35 years (Palmer, 2013; Walschaerts et al., 2008), an age demographic marked by a large amount of years of potential life loss. With early detection, localized TCa is highly treatable with a 99% 5-year survival rate (American Cancer Society, 2015). Approximately half of TCa cases are diagnosed postdiaspora from the testes (Trumbo, 2004), which involves more complicated treatment efforts and substantially lowers the likelihood of survival (American Cancer Society, 2015). In response to a need for early detection of TCa, many promote the practice of testicular self-examination (TSE).

TSE is a technique for males to screen themselves for testicular abnormalities (i.e., lumps, tumors, swelling, etc.), which they are encouraged to report to their primary care physician. Although there are some reservations to promoting the behavior (see Hopcroft, 2012; Lin & Sharangpani, 2010; U.S. Preventive Services Task Force, 2004), the majority of research is supportive of males practicing regular TSE to assist in the early detection of cancer and other health concerns (Brewer, Roy, &

¹University of Central Florida, Orlando, FL, USA

²University of Massachusetts, Lowell, MA, USA

³Temple University, Philadelphia, PA, USA

⁴University of Tennessee, Knoxville, TN, USA

Corresponding Author:

Michael J. Rovito, Department of Health Professions, University of Central Florida, 12805 Pegasus Drive, HPAI Room 269, Orlando, FL 32816, USA.

Email: michael.rovito@ucf.edu

Watters, 2011; Rovito, Gordon, Bass, & DuCette, 2011; Steadman & Quine, 2004). Many health educators report an interest in promoting TSE among males (Evans, Simon, & Wardle, 2010).

Despite well-intentioned promotional efforts, Cronholm, Mao, Nguyen, and Paris (2009) argue that TSE promotional interventions need to improve. A more recent systematic review reported that the majority of analytic studies are still problematic and do not facilitate the dissemination or improvement of promotional services (Rovito, Cavayero, Leone, & Harlin, 2014). Research acknowledges the need for more effective TSE promotional messaging and communication strategies. However, how to best improve this communication is a difficult problem to address. One promising strategy for improving the efficacy of TSE promotion is to meaningfully segment target populations and disseminate tailored communication strategies according to characteristics unique to their segmentation.

Audience Segmentation and Tailored Message Design

The benefits of audience segmentation and tailored message design on health behavior decision making have been extensively outlined in the literature (Blow et al., 2006; Dutta-Bergman, 2003; Heimendinger et al., 2005; Myers et al., 2007; Slater, 1996; Strolla, Gans, & Risica, 2006; Williams-Piehot, Pizarro, Schneider, Mowad, & Salovey, 2005). Compared with the “one size fits all” communication approach, tailored messages are more effective at promoting reflection and encouraging transformative action in a target audience (Cortese & Lustria, 2012; Noar, Benac, & Harris, 2008; Rothman, Salovey, Turvey, & Fishkin, 1993; Sethares & Elliott, 2004; Weinstein, 1994; Williams-Piehot et al., 2005). Despite the documented evidence of the effectiveness of tailoring messages based on audience segmentation, it is argued that many of the interventions that employ this approach are methodologically weak and fail to provide the necessary “personal connection” to encourage behavior change (Brug, Steenhuis, van Assema, & DeVries, 1996; Kreuter, 2000). These weaknesses are, in part, driven by the failure to tailor messaging based on theoretical frameworks that segment population based off of meaningful psychological differences (see Campo, Askelson, Carter, & Losch, 2012 for a similar argument).

Many argue that tailored messaging, segmentation, and health behavior promotion are likely to be more effective if rooted in a theoretical framework (Fishbein & Yzer, 2003; Glanz & Bishop, 2010; Jackson & Waters, 2005; Niederdeppe, Bu, Borah, Kindig, & Robert, 2008; Riekert, Ockene, & Pbert, 2014; Robertson, Douglas, Ludbrook, Reid, & van Teijlingen, 2008). Despite the

need for theory-rooted interventions, there is a persistent underutilization of formal theory within health intervention design (Prestwich et al., 2014). In the past 30 years, only a handful of interventions promoting TSE behaviors have successfully utilized a formal theoretical model in their programs: Marty and McDermott (1986), Walker and Guyton (1989), Murphy and Brubaker (1990), Steadman and Quine (2004), Brown, Patrician, and Brosch (2012), and Wanzer, Foster, Servoss, and LaBelle (2014), among others. Due to this overall lack of theoretically informed TSE interventions, there is currently an emphasis on establishing and developing strong theoretical foundations to augment TSE promotion strategies (McClenahan, Shevlin, Adamson, Bennett, & O'Neill, 2007). Based on the need for behavioral theory-grounded communication, one promising approach is to base audience segmentation techniques off of the theory of planned behavior (TPB).

Theory of Planned Behavior

The TPB was initially designed as an extension of the theory of reasoned action to expand on the notion that intention and behavioral control both have a direct impact on actual behavioral performance (Ajzen, 1985, 1991). The TPB asserts that the behavior of an individual can be predicted by their intention to perform said behavior, which itself is predicted by attitudes, subjective norms, and perceived behavioral controls.

Within the context of TSE promotion, Murphy and Brubaker (1990) formally tested the TPB and its ability to predict TSE performance. The authors suggest that having the attitude/predisposition to change and the perceived ability to perform a behavior influence behavioral intentions. McGilligan, McClenahan, and Adamson (2009) suggested that altering attitudes, subjective norms, and perceived behavioral control are necessary to produce significant changes in intentions to perform TSE. McClenahan et al. (2007) reported that the TPB is the most explanatory health model available. Consequently, this work builds on this theory to create a typology for audience segmentation and message tailoring.

Rationale of the Control Identity Typology

The present work focuses and expands on one aspect of the TPB attitudes. This variable served as the foundation from which a typology would be developed that would aim to segment samples. This typology, in theory, would serve as a rubric from which tailored intervention promotion communications could be developed. The focus on attitude is, in part, based on evidence that it is necessary in producing significant changes in TSE intentions (Barling

& Lehmann, 1999; Brubaker & Wickersham, 1990; Lechner, Oenema, & de Nooijer, 2002; McGilligan et al., 2009; Murphy & Brubaker, 1990). Building on two outcome control factors, locus of control and perception of control, an attitudinal typology labeled Control Identity was developed and tested. Through the acknowledgement of an individual's Control Identity, researchers and health practitioners alike can better tailor TSE promotional communications.

Locus of Control

Outcome control has served as an extension of Rotter's (1966) locus of control research (Skinner, 1996; Wallston & Wallston, 1981). Previous research has demonstrated that individuals receiving information consistent with their health locus of control affiliation (i.e., tailored messaging; see Wallston, 2005) were more likely to perform health behaviors than those individuals receiving information inconsistent with their sense of control (Williams-Piehot et al., 2005). It appears that locus of control is an important variable for researchers to consider. This variable is the first theorized factor in the Control Identity typology.

Perception of Control

The term "perception of control" is defined as the perceptions concerning circumstances where control is either objectively possible (realistic) or impossible (unrealistic). This construct is relatively underresearched in the health sciences, and almost nonexistent in male health research, but has been discussed in other disciplines. Fenton-O'Creevy, Nicholson, Soane, and Willman (2003), for example, outlined the impact of illusions of control (unrealistic outcome control beliefs) on stock trader performance in the marketplace. These authors suggest that the demanding and fiercely competitive environment fosters the development of illusions of control among stock traders relative to risk perception and perceived situational command. Integrating this notion to the discussion of outcome control, unrealistic outcome control beliefs are maladaptive to responsible health behavior decision-making, while realistic outcome control beliefs provide for a conscientious decision-making process (Houghton, Simon, Aquino, & Goldberg, 2000). This variable is the second theorized factor in the Control Identity typology.

Control Identity

In previous applications, locus of control and illusions of control have independently been identified to influence behavioral decisions. Little research have integrated or

examined these variables at the same time. Despite their independently assessed effects, locus of control and perception of control have never been used collectively as an approach in segmenting populations.

Integrating these two variables in a 2×2 fashion, a four-group typology, deemed Control Identity, was produced and yielded the following categorizations: Realistic Internals, Realistic Externals, Unrealistic Internals, and Unrealistic Externals. The four groups are presumed to differ in: (a) perceived vulnerability, (b) perceived value of health promotion, and (c) perceived health outcome control beliefs.

Applying the aforementioned types to TCa, individuals with highly unrealistic control beliefs presumably tend to possess maladaptive illusions of health outcome manipulation (i.e., either believing they have complete control, or no control, over being diagnosed with TCa, or overvaluing or undervaluing their ability to contribute to other health outcomes). Therefore, having an overinflated or underinflated sense of outcome control can become detrimental to health and well-being, thereby earning the term, unrealistic. Those individuals with a more realistic sense of health outcome control, either internally or externally dominated, will be more open to adaptive behaviors (i.e., TSE) to foster the best possible outcomes (i.e., early detection of TCa, leading to decreased mortality rates).

Given the discussed need for methodologically sound decision aids and communication strategies in TSE promotion both in the clinic and the community, the authors suggest that this typology can assist health practitioners in delivering effective tailored health education that are grounded in the TPB. Statistical procedures outlining the existence of this typology are presented below.

Method

Four outcome control dispositions, called Control Identity, were defined a priori based on the dimensions of illusions of control (realistic/unrealistic) and locus of control (internal/external). An original 41-item survey, the Control Identity Assessment Scale (CIAS), was developed to assess perceived vulnerability, perceived value of health promotion, and perceived health outcome control among a convenience sample of 300 university males aged 18 to 35 years via a cross-sectional research design. All participants consented to completing the onetime survey via informatory letter. Temple University's institutional review board approved the conduct of this study. These 300 participants were asked to complete both the CIAS and the Multidimensional Health Locus of Control Survey (MHLCS; Wallston & Wallston, 1981; adapted from Rotter, 1966) either through hard copy or web-based format. The MHLCS is a gold standard tool used to assess

locus of control as it pertains to perceptions and attitudinal dispositions of health outcomes. The instrument was employed in this study to assess psychometric properties of select portions of the CIAS.

Questions on the CIAS were grouped into five parts, three general health and two TCa/TSE-specific composites: perceived health outcome control beliefs (general health), perceived vulnerability (general health), perceived value of health promotion (general health), knowledge and awareness (TCa/TSE-specific), and intention to perform TSE (TCa/TSE-specific). Questions on knowledge and awareness of TCa and TSE were included in the CIAS to draw applicable conclusions (24 out of the 41 CIAS items). A panel of experts was consulted to develop content validity of measures.

Variables on the CIAS were measured on an 11-point scale (0-10; 0 = *not at all agree*, 10 = *completely agree*) where lower scores reflected less importance/relevance to the participant and higher scores indicating an increased importance/relevance. The MHLCS was originally measured on a 1 to 6 scale. However, to achieve consistency in measurement scale bases, the 1 to 6 scale was converted to a 0 to 10 scale. The use of an 11-point scale potentially increases variability of responses, permitting finer distinctions.

A principal components exploratory factor analysis with varimax rotation was employed a posteriori to define the underlying structure of the data. Although the a priori composite variables were hypothesized to be latent constructs of the Control Identity typology, this is a novel concept. Therefore, in order to increase the validity of findings, an exploratory, instead of confirmatory, factor analysis was employed to assist in determining how many factors were needed to represent the data best. A k-means cluster analysis was conducted on the exploratory factors to produce a four-group typology in order to preliminarily assess the Control Identity typology's existence.

Subsequent multivariate analyses were employed to test for significant differences between clusters on "intention to perform" TSE and other primary outcomes. These analyses allowed for the development of implications about clinical and community-based program use of the typology. Through the use of segmenting audiences via Control Identity dispositions, and tailoring promotional messages to each type, health professionals can therefore, arguably, increase the effectiveness of treatments, interventions, and communication via tailored messaging.

Results

Demographics

Approximately 70% of the sample indicated they were White (non-Hispanic), 14% Black (non-Hispanic), 4.5%

Hispanic (any race), 6.5% Asian/Pacific Islander, and 5% unknown/mixed/other. Average age was approximately 23 years ($\bar{x} = 22.74$). This data mirrored demographics at a large state-affiliated university from which they were sampled. This also is representative of the demographic breakdown for TCa incidence among males.

Reliability and Validity Measures

The factor analysis produced a very consistent five-factor structure matrix based on the three general health sections in the CIAS addressing perceptions of vulnerability, value of health promotion, and health outcome control. Knowledge-based questions about TCa and TSE were excluded from the factor analysis as most men were generally unaware of the facts and risks of the disease. Bartlett's test for sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy (calculated at $<.001$ and $.768$, respectively) demonstrated adequate correlation among the data to conduct a factor analysis.

The cutoff scores for factor loadings and eigenvalues were designated as 0.40 and 1.0, respectively. Five underlying factors were extracted that represents the Control Identity. The first factor (five items), labeled I-Control, reflected the individual's sense of internal control. The second factor (four items), labeled Others-Control, reflected the extent to which external factors controlled one's life, including chance or powerful others. The third factor (three items), labeled Value of Health Promotion, represented the perceived importance of health promotion activities in the individual's life. The fourth factor (three items), labeled Vulnerability, represented perceived susceptibility to death and disease. The fifth factor (two items), labeled Manipulation, represented perceived ability to influence external events or other people's behavior.

The five underlying factors accounted for ~70% of the variance in survey responses and closely paralleled the operational definitions of the original composite variables (perceived vulnerability, value of health promotion, and health outcome control) theorized to create the foundations of the Control Identity typology. This provided for face validity of the structure matrix. Factors 1 and 2 (I-Control and Others-Control) explained ~43% of the variance and were representative of internal and external locus of control, respectively.

Each of the five latent constructs had high factor loadings on the variables designated to each respective factor, thus indicating elements of unidimensionality within each factor. Furthermore, Harman's single-factor test indicated $<25\%$ of shared variance between factors. Limited cross-loading was present between I-Control and Manipulation but did not pose a significant threat to the validity of the matrix. The aforementioned qualities

Table 1. Cluster Membership and Aggregate CIAS Factor Means.

Variable	Cluster			
	(1) RE	(2) RI	(3) UI	(4) UE
I-Control	6.96	7.79	8.07	6.18
Others-Control	5.96	2.61	2.06	4.39
Value Health Promotion	8.93	9.26	8.99	5.96
Vulnerability	8.12	8.44	4.51	4.78
Manipulation	6.85	7.39	7.21	5.51
Intention	6.95	7.50	6.66	5.05

Note. CIAS = Control Identity Assessment Scale; RE = Realistic Externals; RI = Realistic Internals; UI = Unrealistic Internals; UE = Unrealistic Externals.

demonstrates both convergent validity within, and discriminant validity between, factors, as well as a limited presence of method bias.

Cronbach's alpha was calculated for each of the five latent constructs, as well as on two composite variables calculated from the MHLCS that assessed concepts of internal and external locus of control. A comparison of alpha scores (all highly consistent) between the I-Control and Others-Control factors from the CIAS data and the two MHLCS factors demonstrated consistency between composite variables on measuring locus of control concepts (internal control: CIAS, $\alpha = .817$; MHLCS, $\alpha = .861$; external control: CIAS, $\alpha = .807$; MHLCS, $\alpha = .831$). The parallels between the CIAS and MHLCS assist in confirming the construct validity of the CIAS measures of internal (I-Control) and external (Others-Control) control. Cronbach's alpha was also calculated for the other three CIAS factors: Value of Health Promotion ($\alpha = .885$), Vulnerability ($\alpha = .777$), and Manipulation ($\alpha = .727$).

Control Identity Clusters

A k-means cluster analysis was employed to classify four types of individuals relative to their mean factor scores (Table 1). This particular method of clustering was used due to the relatively large sample size of the study and its proclivity to achieve high internal (within-cluster) homogeneity and high external (between-cluster) heterogeneity.

Knowledge-based CIAS variables were not used in the clustering process since the typology was to be based on health attitudes and values, and not knowledge. Furthermore, questions on intention to perform TSE were not used in the clustering of participants, as this variable, labeled Intention to Perform TSE, was calculated for each cluster group in order to test for significant between-cluster differences.

Cluster 1 ($n = 82$, 27.3% of total) had a mean score of 6.96 on I-Control and 5.96 on Others-Control. This indicates a moderate sense of control that is neither

dominated by internal nor external dispositions. Participants in this group had a high Value Health Promotion mean score (8.93), believe they are susceptible to death and disease (8.12; i.e., Vulnerability), and have a generally positive sense of their ability to influence situations and others (6.85; i.e., Manipulation). Their mean Intention to Perform TSE was 6.95, thus indicating that they would be generally unopposed to adopting preventive behaviors. These authors suggest that Cluster 1 closely resembled the a priori definition of Realistic Externals (RE).

Cluster 2 ($n = 127$, 42.3%) had a mean score of 7.79 on I-Control and 2.61 on Others-Control, indicating a strong sense of internal control. Participants in this group had a very high Value Health Promotion mean score (9.26), believe they are susceptible to adverse health events (8.44; i.e., Vulnerability), and have a strong belief that they can influence others' behavior (7.39; i.e., Manipulation). Their mean intention to perform TSE score was 7.50, thus indicating a willingness to perform preventive behaviors. Cluster 2 mirrored the definition of the Realistic Internals (RI), particularly in their intention to perform score as these individuals were theoretically projected to be the most open to adopting new behaviors or altering existing ones.

Cluster 3 ($n = 51$, 17.0%) had a mean score of 8.07 on I-Control and 2.06 on Others-Control. Participants in this group has the strongest sense of internal control of all groups. These participants also look at health promotion behaviors very favorably (8.99; i.e., Value Health Promotion) and believe they have a solid ability to manipulate situations and others (7.21; i.e., Manipulation). However, they perceive their sense of Vulnerability to be relatively low (4.51), as compared with Clusters 1 and 2. Finally, they have a reasonably high mean score on intention to perform TSE (6.66), indicating they would not be averse to adopting preventive behaviors. Cluster 3 mirrored the definition of Unrealistic Internals (UI).

Cluster 4 ($n = 40$, 13.3%) had a lower score of I-Control than the others clusters (6.18) and the second

highest mean score on the Others-Control variable (4.39). These individuals assign a relatively low importance to health promotion techniques compared with the other clusters (5.96 compared with 8.93, 9.26, and 8.99; i.e., Value Health Promotion). Furthermore, of all the clusters they have the second lowest Vulnerability mean score (4.78) and they have the lowest sense of their ability to influence or manipulate others (5.51; i.e., Manipulation). Their Intention to Perform TSE mean score was also the lowest among all clusters (5.05), which suggests that this group would be the most difficult of the clusters to persuade to perform TSE. This cluster very closely parallels the definition of the Unrealistic Externals (UE).

Testing of significant mean differences across clusters on the five CIAS factors allowed for the determination of any significant differences between clusters groups. Analysis of variance tests indicated significant differences between clusters on I-Control, Others-Control, Value Health Promotion, Vulnerability, Manipulation, and Intention to Perform TSE (all $p < .001$). A Tukey HSD (honest significant difference) was run to determine significant relationships between individual clusters (see Table 2).

Discussion

These findings suggest that participant males have different perceptions of vulnerability, value of health promotion, and health outcome control, and therefore, Control Identities, as it pertains to TCa and TSE. The underlying premise of this typology asserts that health educators, practitioners, counselors, and so on, can tailor preventive health messages more efficiently and increase their effectiveness in promoting healthy behaviors. Therefore, the following conclusions and implications can be drawn.

Based on locus of control and illusions of control constructs, a typology of men exists with four distinct groups significantly different from one another. Furthermore, the CIAS produced appropriate psychometric scores, thus, which now offers researchers the opportunity to efficiently segment male samples into the Control Identity typology.

Previous research indicates that even when TSE was successfully promoted, its use was often not sustained postintervention; which is often attributed to a flaw in the message (Morman, 2000). Researchers also tended to use or discuss one homogenous message on the value of TSE in intervention studies. Although sometimes offered through different media (e.g., shower hang-ups, flyers, TV, peer groups; Rosella, 1994; Walker & Guyton, 1989), there has been little or no variation in the content of the material. Due to the ineffectiveness of current messaging strategies to promote TCa knowledge and TSE performance, TSE promotional/informational messages need to be presented in more creative ways (Brown, 2004).

In general, tailored communication has been reported to promote healthy behaviors more effectively than other mechanisms of health communication (Cortese & Lustria, 2012; Noar, Benac, & Harris, 2007; Suggs & McIntyre, 2009). The Control Identity typology could be used to tailor messages to males based on psychological characteristics, making it more personal, attractive, and, hopefully, effective in promoting health behaviors such as TSE.

This research also has implications for expanding the use of locus of control and the TPB in research studies. Previous research noted the limited value of using locus of control as a predicative variable in behavioral studies (Katz, Meyers, & Walls, 1995). In this study, the use of the MHLCS (Wallston & Wallston, 1981) and the “realistic versus unrealistic” expansion of the control concept provided for a more innovative use of the locus of control concept. The results of this study suggest that locus of control may still be a legitimate construct for use in health behavior studies.

Based on the high variance explained, and the consistent results of the factor analysis centered on the idea of judgment and attitudinal factors, the “attitude” construct of the TPB is well represented by the Control Identity typology. Therefore, this concept can be used in future studies assessing health behaviors through the TPB, which supports McClenahan et al. (2007) and McGilligan et al.’s (2009) assertion that the model is the most explanatory in TSE intervention research.

The methods used in this research have a potentially wide application across the cancer continuum from primary prevention and screening to treatment and end-of-life decisions. Although centered on TCa and TSE, future studies should consider expanding the application of this typology to other health behavior interventions. However, further work is needed to fully understand the role that illusions of control play in health beliefs and how that relates to the constructs of the TPB and locus of control. Although the results suggest a stratification of men in terms of control perception on the axes of illusions of control and locus of control, this typology needs to be explored further for verification.

Recommendations

There are limitations in this study design. The CIAS needs to be refined and replicated with a larger sample. The survey is repetitive in the measurement of some concepts. Although this provided a repeated measures–validity check, it swelled the survey to 41 questions. Items will need to be developed further as to eliminate cross-loading of factors. This will increase convergent and discriminant validity. In addition, the survey should be reviewed to ensure that each of the core variables extracted from the factor analysis used to cluster the sample is theoretically and conceptually sound.

Table 2. Post Hoc Analysis Between Group Means.

Variable	Cluster (I)	Cluster (J)	Mean difference (I - J)	SE	Significance
I-Control	1	2	-0.82973*	0.20202	.000
		3	-1.11841*	0.25431	.000
		4	0.77610*	0.27502	.026
	2	3	-0.28868	0.23640	.614
		4	1.60583*	0.25855	.000
	3	4	1.89451*	0.30118	.000
Others-Control	1	2	3.34816*	0.18965	.000
		3	3.90154*	0.23873	.000
		4	1.56662*	0.25818	.000
	2	3	0.55338	0.22192	.063
		4	-1.78155*	0.24272	.000
	3	4	-2.33493*	0.28274	.000
Value Health Promotion	1	2	-0.33301	0.18618	.281
		3	-0.06663	0.23437	.992
		4	2.96850*	0.25346	.000
	2	3	0.26638	0.21787	.613
		4	3.30151*	0.23828	.000
	3	4	3.03513*	0.27757	.000
Vulnerability	1	2	-0.32162	0.18903	.325
		3	3.61215*	0.23795	.000
		4	3.33862*	0.25734	.000
	2	3	3.93377*	0.22120	.000
		4	3.66024*	0.24193	.000
	3	4	-0.27353	0.28181	.766
Manipulation	1	2	-0.54004	0.22541	.080
		3	-0.35222	0.28375	.601
		4	1.34116*	0.30687	.000
	2	3	0.18782	0.26377	.892
		4	1.88120*	0.28849	.000
	3	4	1.69338*	0.33606	.000
Intention	1	2	-0.54878	0.32438	.330
		3	0.29436	0.40834	.889
		4	1.90122*	0.44161	.000
	2	3	0.84314	0.37959	.120
		4	2.45000*	0.41516	.000
	3	4	1.60686*	0.48361	.006

Note. SE = standard error. * = statistically significant

Pertaining to sample size, size estimators indicated that at 95% confidence, coupled with the sample size of males enrolled at the university, the target *n* size was ~350 males. Although more than 350 males were reached to begin the survey, only 300 had fully completed questionnaires. The sample generally mirrored the racial/ethnic makeup of the university; however, a more concerted effort to increasing diversity could have been made as well as expanding sample collection outside of the university setting. Although these concerns introduced selection bias into the study, the authors are confident that the amount was limited and did not significantly affect the validity of findings. Yet these results are generalizable primarily to college males.

Although terms such as “realistic and unrealistic” were appropriate for this exploratory study, given the results of the present research, other concepts or labels may be more appropriate and/or more easily operationalized. For example, illusions of control may turn out to more accurately reflect the underlying cognitive processes at work. Similarly, perhaps different terms should be used to describe the types.

There may be confusion on the labeling of Clusters 1 (RE) and 4 (UE) as externally dominated when their I-Control scores were greater than their Others-Control scores. As all four clusters had greater I-Control scores than Others-Control scores, the distinction to separate

clusters between internal and external control stemmed from the difference in mean I-Control and Others-Control scores for each cluster. Clusters 2 (RI) and 3 (UI) had the largest differences between both of the latent factors, which contributed to their labeling as internally dominated. Coupled with how they scored on the other latent factors, these authors deemed it appropriate to label them accordingly. However, as this concept is novel, these results need to be refined and replicated further to support these claims.

Finally, based solely on survey responses, the results are threatened by recall bias. This is particularly important when addressing such private issues with men such as TCa and TSE procedures.

Conclusion

The Control Identity typology is resultant from a cross-sectional design aiming to assess perceived vulnerability, value of health promotion, and health outcome control. The a priori operational definitions of the typology were subsequently confirmed by a series of factor and cluster analyses. When segmented into one of the four Control Identity types, health professionals can identify beliefs and values of TSE among males more efficiently, which can theoretically assist in crafting more effective health educational programming.

Decision aids grounded in the best available evidence will support optimal decision making and most effective health education tools only if the decision aids frame evidence in ways that are also consistent with and tailored to the risk-benefit conceptual frames of the target population. The challenge is to find effective and efficient methods to frame messages using these elements to promote health behaviors and facilitate health education efforts. This study offers the academy a Control Identity typology to segment their target male populations, which can more effectively tailor their promotional messages.

The goal is to be able to provide health practitioners the option to administer the CIAS in order to assess male patient outcome control disposition (i.e., their Control Identity type) as it has potential to be an influential variable in adherence to treatment, communication, or preventive regimens. The survey could be given with other compulsory paperwork/documentation, thereby allowing the clinician to gain insight on the patient. The information on a male patient's Control Identity disposition would allow the practitioner to tailor their approach to providing and communicating care to that specific individual, therefore making it more effective.

Future research needs to be conducted to test the effectiveness of said tailored messages as defined by the Control Identity typology. The authors encourage health interventions aiming to implement this typology to

ground its use in the framework of the TPB and be mindful that interactions between attitudes (Control Identity), subjective norms, and perceived behavioral control could affect the effectiveness of the tailored messages.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 11-39). Berlin, Germany: Springer-Verlag.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- American Cancer Society. (2015). *Testicular cancer*. Retrieved from <http://www.cancer.org/cancer/testicularcancer/detailedguide/testicular-cancer-what-is-cancer>
- Barling, N. R., & Lehmann, M. (1999). Young men's awareness, attitudes and practice of testicular self-examination: A health action process approach. *Psychology, Health & Medicine*, 4, 255-263.
- Blow, F. C., Barry, K. L., Walton, M. A., Maio, R. F., Chermack, S. T., Bingham, C. R., . . . Strecher, V. J. (2006). The efficacy of two brief intervention strategies among injured, at-risk drinkers in the emergency department: Impact of tailored messaging and brief advice. *Journal of Studies on Alcohol*, 67, 568-578.
- Brewer, G., Roy, M., & Watters, J. (2011). Testicular self-examination in an adult community sample. *American Journal of Men's Health*, 5, 57-64.
- Brown, C. G. (2004). Testicular cancer: An overview. *Urologic Nursing*, 24, 83-94.
- Brown, C. G., Patrician, P. A., & Brosch, L. R. (2012). Increasing testicular self-examination in active duty soldiers: An intervention study. *Medsurg Nursing*, 21, 97-103.
- Brubaker, R. G., & Wickersham, D. (1990). Encouraging the practice of testicular self-examination: A field application of the theory of reasoned action. *Health Psychology*, 9, 154-163.
- Brug, J., Steenhuis, I., van Assema, P., & DeVries, H. (1996). The impact of a computer-tailored nutrition intervention. *Preventative Medicine*, 25, 236-242.
- Campo, S., Askelson, N. M., Carter, K. D., & Losch, M. (2012). Segmenting audiences and tailoring messages: Using the extended parallel process model and cluster analysis to improve health campaigns. *Social Marketing Quarterly*, 18, 98-111.
- Cortese, J., & Lustria, M. L. A. (2012). Can tailoring increase elaboration of health messages delivered via an adaptive educational site on adolescent sexual health and decision

- making? *Journal of the American Society for Information Science and Technology*, 63, 1567-1580.
- Cronholm, P. F., Mao, J. J., Nguyen, G. T., & Paris, R. T. (2009). A dilemma in male engagement in preventive services: Adolescent males' knowledge and attitudes toward testicular cancer and testicular self-exam. *American Journal of Men's Health*, 3, 134-140.
- Dutta-Bergman, M. J. (2003). The linear interaction model of personality effects in health communication. *Health Communication*, 15, 101-116.
- Evans, R. E., Simon, A. E., & Wardle, J. (2010). Public perceptions of the harms and benefits of testicular cancer education: A qualitative study. *Cancer Epidemiology*, 34, 212-219.
- Fenton-O'Creevy, M., Nicholson, N., Soane, E., & Willman, P. (2003). Trading on illusions: Unrealistic perceptions of control and trading performance. *Journal of Occupational and Organizational Psychology*, 76, 53-68.
- Fishbein, M., & Yzer, M. C. (2003). Using theory to design effective health behavior interventions. *Communication Theory*, 13, 164-183.
- Giannandrea, F., Paoli, D., Figà-Talamanca, I., Lombardo, F., Lenzi, A., & Gandini, L. (2013). Effect of endogenous and exogenous hormones on testicular cancer: The epidemiological evidence. *International Journal of Developmental Biology*, 57, 255-263.
- Glanz, K., & Bishop, D. B. (2010). The role of behavioral science theory in development and implementation of public health interventions. *Annual Review of Public Health*, 31, 399-418.
- Heimendinger, J., O'Neill, C., Marcus, A. C., Wolfe, P., Julesburg, K., Morra, M., . . . Lipkus, I. (2005). Multiple tailored messages are effective in increasing fruit and vegetable consumption among callers to the Cancer Information Service. *Journal of Health Communication*, 10(Suppl. 1), 65-82.
- Hopcroft, K. (2012). Routine testicular self-examination: It's time to stop. *British Medical Journal*, 344, e2120. doi:10.1136/bmj.e2120
- Houghton, S. M., Simon, M., Aquino, K., & Goldberg, C. B. (2000). No safety in numbers: Persistence of biases and their effects on team risk perception and team decision making. *Group & Organization Management*, 25, 325-353.
- Jackson, N., & Waters, E. (2005). Criteria for the systematic review of health promotion and public health interventions. *Health Promotion International*, 20, 367-374.
- Katz, R. C., Meyers, K., & Walls, J. (1995). Cancer awareness and self-examination practices in young men and women. *Journal of Behavioral Medicine*, 18, 377-384.
- Kreuter, M. (2000). *Tailoring health message: Customizing communication with computer technology*. Mahwah, NJ: Lawrence Erlbaum.
- Lechner, L., Oenema, A., & de Noijer, J. (2002). Testicular self-examination (TSE) among Dutch young men aged 15-19: Determinants of the intention to practice TSE. *Health Education Research*, 17, 73-84.
- Lin, K., & Sharangpani, R. (2010). Screening for testicular cancer: An evidence review for the U.S. preventive services task force. *Annals of Internal Medicine*, 153, 396-399.
- Marty, P. J., & McDermott, R. J. (1986). Three strategies for encouraging testicular self-examination among college-aged males. *Journal of American College Health*, 34, 253-258.
- McClenahan, C., Shevlin, M., Adamson, G., Bennett, C., & O'Neill, B. (2007). Testicular self-examination: A test of the health belief model and the theory of planned behaviour. *Health Education Research*, 22, 272-284.
- McGilligan, C., McClenahan, C., & Adamson, G. (2009). Attitudes and intentions to performing testicular self-examination: Utilizing an extended theory of planned behavior. *Journal of Adolescent Health*, 44, 404-406.
- Morman, M. T. (2000). The influence of fear appeals, message design, and masculinity on men's motivation to perform the testicular self-exam. *Journal of Applied Communication Research*, 28, 91-116.
- Murphy, W. G., & Brubaker, R. G. (1990). Effects of a brief theory-based intervention on the practice of testicular self-examination by high school males. *Journal of School Health*, 60, 459-462.
- Myers, R. E., Sifri, R., Hyslop, T., Rosenthal, M., Vernon, S. W., Cocroft, J., . . . Wender, R. (2007). A randomized controlled trial of the impact of targeted and tailored interventions on colorectal cancer screening. *Cancer*, 110, 2083-2091.
- Niederdeppe, J., Bu, Q. L., Borah, P., Kindig, D. A., & Robert, S. A. (2008). Message design strategies to raise public awareness of social determinants of health and population health disparities. *Milbank Quarterly*, 86, 481-513.
- Noar, S. M., Benac, C. N., & Harris, M. S. (2007). Does tailoring matter? Meta-analytic review of tailored print health behavior change interventions. *Psychological Bulletin*, 133, 673-693.
- Palmer, L. S. (2013). Hernias and hydroceles. *Pediatrics in Review/American Academy of Pediatrics*, 34, 457-464. doi:10.1542/pir.34-10-457
- Powe, B. D., Ross, L., Wilkerson, D., Brooks, P., & Cooper, D. (2007). Testicular cancer among African American college men: Knowledge, perceived risk, and perceptions of cancer fatalism. *American Journal of Men's Health*, 1, 73-80.
- Prestwich, A., Sniehotta, F. F., Whittington, C., Dombrowski, S. U., Rogers, L., & Michie, S. (2014). Does theory influence the effectiveness of health behavior interventions? Meta-analysis. *Health Psychology*, 33, 465-474.
- Riekert, K. A., Ockene, J. K., & Pbert, L. (2014). *The handbook of health behavior change* (4th ed.). New York, NY: Springer.
- Robertson, L. M., Douglas, F., Ludbrook, A., Reid, G., & van Teijlingen, E. (2008). What works with men? A systematic review of health promoting interventions targeting men. *BMC Health Services Research*, 8, 141. doi:10.1186/1472-6963-8-141
- Rosella, J. D. (1994). Testicular cancer health education: An integrative review. *Journal of Advanced Nursing*, 20, 666-671.
- Rothman, A. J., Salovey, P., Turvey, C., & Fishkin, S. A. (1993). Attributions of responsibility and persuasion: Increasing mammography utilization among women over 40 with an internally oriented message. *Health Psychology*, 12, 39-47.

- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied*, 80(1), 1-28.
- Rovito, M. J., Cavayero, C., Leone, J. E., & Harlin, S. (2014). Interventions promoting testicular self-examination (TSE) performance: A systematic review. *American Journal of Men's Health*, 9, 506-518.
- Rovito, M. J., Gordon, T. F., Bass, S. B., & DuCette, J. (2011). Perceptions of testicular cancer and testicular self-examination among college men: A report on intention, vulnerability, and promotional material preferences. *American Journal of Men's Health*, 5, 500-507.
- Sethares, K. A., & Elliott, K. (2004). The effect of a tailored message intervention on heart failure readmission rates, quality of life and benefit and barrier beliefs in persons with heart failure. *Heart & Lung*, 33, 249-260.
- Skinner, E. A. (1996). A guide to constructs of control. *Journal of Personality and Social Psychology*, 71, 549-570.
- Slater, M. D. (1996). Theory and method in health audience segmentation. *Journal of Health Communication*, 1, 267-283.
- Steadman, L., & Quine, L. (2004). Encouraging young males to perform testicular self-examination: A simple, but effective, implementation intentions intervention. *British Journal of Health Psychology*, 9, 479-487.
- Strolla, L. O., Gans, K. M., & Risica, P. M. (2006). Using qualitative and quantitative formative research to develop tailored nutrition materials for a diverse low-income audience. *Health Education Research*, 21, 465-476.
- Suggs, L. S., & McIntyre, C. (2009). Are we there yet? An examination of online tailored health communication. *Health Education & Behavior*, 36, 278-288.
- Trumbo, C. W. (2004). Mass-mediated information effects on testicular self-examination among college students. *Journal of American College Health*, 52, 257-262.
- U.S. Preventive Services Task Force. (2004). *Screening for testicular cancer: Recommendation statement*. Rockville, MD: Agency for Healthcare Research and Quality.
- Walker, R., & Guyton, R. (1989). Modeling and guided practice as components within a comprehensive testicular self-examination cancer education program. *Journal of American College Health*, 37, 211-215.
- Wallston, K. A. (2005). The validity of the multidimensional health locus of control scales. *Journal of Health Psychology*, 10, 623-631.
- Wallston, K. A., & Wallston, B. S. (1981). Health locus of control scales. In H. Lefcourt (Ed.), *Research with the locus of control construct* (Vol. 1, pp. 189-243). New York, NY: Academic Press.
- Walschaerts, M., Huyghe, E., Muller, A., Bachaud, J., Bujan, L., & Thonneau, P. (2008). Doubling of testicular cancer incidence rate over the last 20 years in southern France. *Cancer Causes & Control*, 19, 155-161.
- Wanzer, M. B., Foster, S. C., Servoss, T., & LaBelle, S. (2014). Educating young men about testicular cancer: Support for a comprehensive testicular cancer campaign. *Journal of Health Communication*, 19, 303-320.
- Weinstein, A. (1994). *Market segmentation: Using demographics, psychographics, and other niche marketing techniques to predict and model customer behavior*. Chicago, IL: Probus.
- Williams-Piehota, P., Pizarro, J., Schneider, T. R., Mowad, L., & Salovey, P. (2005). Matching health messages to monitor-blunter coping styles to motivate screening mammography. *Health Psychology*, 24, 58-67.