

Quality of online physical activity information for long-haul truck drivers

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Structured Abstract:

- **Purpose:** Most long-haul truck drivers are physically inactive. Despite being identified as a source of health information, online physical activity and exercise information has not been evaluated for this population. This study evaluated the accessibility, accuracy, technical and theoretical quality, and readability of online physical activity, exercise, and sport information for long-haul truck drivers.
- **Design/methodology/approach:** A standardized protocol was followed to identify and evaluate websites. Websites were included in the review if they met the following criteria: 1) presented information on physical activity, exercise, or sport; 2) provided information for long-haul truck drivers; and 3) provided information in English. Each website was evaluated independently by the two study authors. After evaluating the websites independently, the authors then met to discuss each construct for each website.
- **Findings:** Overall, 44 websites were reviewed. Nine websites provided information based on physical activity guidelines. Most websites scored poorly on technical and theoretical quality. Twenty-eight websites provided information that was written above the recommended grade 8 reading level.
- **Research limitations/implications:** Research has shown that theoretically designed physical activity and exercise interventions are more successful than those with no theoretical underpinnings. Creating websites or online applications using behavioural theory and improving the readability of online health information may help increase levels of physical activity and improve overall health for this population.
- **Originality/value:** No previous research has examined the quality of online physical activity, exercise, or sport information for long-haul truck drivers. This is the first study to examine how online health information for this population can be improved.

Keywords: Long-haul truck drivers, physical activity, exercise, sport, health, Internet

Article Classification:

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Running Heads:

Quality of online physical activity information for truckers

Regular physical activity is associated with multiple health benefits, including the prevention of several chronic illnesses (Warburton et al., 2010). Studies using objective forms of physical activity measurement show that both American and Canadian adult populations are mostly inactive and not achieving the recommended levels of 150-min of moderate and vigorous physical activity each week (Colley et al., 2010; Tucker et al., 2011). Studies have shown that low levels of physical activity and higher levels of overweight and obesity in adults can be attributed to sedentary work environments (Choi et al., 2010; Lakdawalla and Philipson, 2007; Philipson, 2001). Long-haul truck drivers face particularly sedentary working conditions (Apostolopoulos et al., 2012a). For these workers, time spent being sedentary may be even longer than that of other workers, with the average truck driver working approximately 60 hours per week (Apostolopoulos et al., 2013). Findings from cross-sectional, self-report studies have consistently reported that the majority of long-haul truck drivers are physically inactive (Apostolopoulos et al., 2013; Whitfield Jacobson et al., 2007). Low levels of physical activity for this population are especially concerning given that most truck drivers are overweight or obese and are at an elevated risk of mortality from cardiovascular disease and diabetes (Apostolopoulos et al., 2010; Aronson et al., 1999; Robinson and Burnett, 2005; Saltzman and Belzer, 2007).

Given the numerous health conditions truck drivers face, providing health information may be one strategy to raise awareness about the importance of physical activity and help improve the overall health of this population. Relevant health information can help individuals become active by providing the rationale and specific directions necessary to change one's behavior (Kreps, 2001). Based on the Ecological model for active living (Sallis, Cervero,

Ascher, Henderson, Kraft, & Kerr, 2006), robust information environments have been identified as important components of large complex health promotion strategies that can help motivate people to engage in physical activity. Information about physical activity can be delivered through various messengers and methods at different levels of the Ecological model (Sallis et al., 2006). Health information can be individually tailored and delivered through counseling in healthcare settings or distributed more broadly through news, advertising, and mass and social media.

Findings from a cross-sectional study have shown that long-haul truck drivers have indicated that they are concerned about their overweight and obesity and would be receptive to health information about exercise and physical activity in order to improve their health (Apostolopoulos et al., 2013). Findings from this study also indicated that the Internet is an important source of health information for truck drivers. Providing high quality online information may be one tool to help long-haul truck drivers increase their level of physical activity and improve their overall health. Cross-sectional research that has examined the health behaviors of long-haul truck drivers has shown that in addition to the Internet, truck drivers view primary health care providers as the best source of health information (Apostolopoulos et al., 2013). However, a number of studies have shown that long-haul truck drivers face many challenges in regularly seeing their primary care providers (Apostolopoulos et al., 2013; Solomon et al., 2004). The Internet is a convenient, anonymous, and relatively low-cost option when individuals need to access health information and may not be able to immediately see their primary health care provider. Occupational and environmental nurses who work with long-haul truck drivers have also advocated for the creation of interactive websites with real-time health

care information to promote wellness through the adoption of healthful behaviors, such as healthful eating and physical activity (Layne et al., 2009). In order for health information to have a meaningful health behavior outcome, research shows that it needs to be tailored to the specific needs of the targeted population (Hawkins, Kreuter, Resnicow, Fishbein, Dijkstra, 2008; Kreuter & Wray, 2003). Creating websites with tailored health information for long-haul truck drivers would need to fit within health promotion programs that are designed to address risk factors that are specific to this occupational group (Apostolopoulos et al., 2012a; Transportation Research Board of the National Academics, 2007).

Researchers who have examined online physical activity information for the general population have shown that the Internet is a useful, popular, and convenient source to help people become physically active (Bonnar-Kid et al., 2009). Previous research has also shown that online health information is not subjected to rigorous standards of review, potentially affecting the overall integrity of the information and compromising its ability to change intended behaviors (Jetha et al., 2011). Despite being identified as a potential source of health information, online physical activity, exercise and sport information has not been evaluated for this population. The purpose of this study was to evaluate the accuracy, technical and theoretical quality, and readability of online physical activity, exercise, and sport information for long-haul truck drivers.

Method

Inclusion and Exclusion Criteria

A methodology devised by Jetha et al. (2011) to identify and evaluate websites was adapted for this review. Websites were included in the review if they met the following criteria:

1) presented information on physical activity, exercise, or sport; 2) provided information for long-haul truck drivers; and 3) provided information in English. For this review, *physical activity* was defined as “any bodily movement produced by skeletal muscles that results in energy expenditure.” (Caspersen et al., 1985, p. 126). *Exercise* was defined as “physical activity that is planned, structured, repetitive, and purposive” where the improvement or maintenance of physical fitness is the main goal (Caspersen et al., 1985, p.128). *Sport* was defined as “all forms of physical activity, which, through casual or organized participation, aim at expressing or improving physical fitness and mental well-being, forming social relationships or obtaining results in competition at all levels” (Council of Europe, 2011). Websites were excluded from this review if: 1) they were a compilation of external links with no other content or 2) provided information only for professional academic purposes (e.g.. academic journals).

Search Protocol

Two strategies were used to locate websites for this review. First, the Truckers Research for Innovation Health Promotion Programs (TRIHPP) website was reviewed for potential websites. The websites of TRIHPP’s partners and collaborators were also examined for other potential websites. Second, a GOOGLE search protocol adapted from Harland and Bath (2007) was followed to locate websites. This search protocol called for examining the first four pages of links for each search term (approximately 40 links per search term). Search terms included: “physical activity and trucking”; “physical activity and truck”; “exercise and trucking”; “exercise and truck”; “sport and trucking”; and “sport and truck”. The search protocol represented an approach that would have been undertaken by a “typical user” (Jetha et al., 2011). In total, 44 websites were included in the review. See Appendix A for a list of included websites.

Website Evaluation

The accessibility, accuracy, and overall quality of websites was evaluated using protocols established by Scerbo et al. (2006), Doshi et al. (2003), and Jetha et al. (2011). Descriptive characteristics included website type (e.g., trucking industry, health, news agency, academic, community-based, independent (e.g., blogs, independent truck drivers), non-trucking commercial (e.g., companies not directly associated with trucking)); accessibility (e.g., number of clicks to reach relevant information); availability of other physical activity, exercise, or sport websites specifically for truck drivers; availability of communication outlets (e.g., email) and other interactive features for users (e.g., comment boards, discussion boards); and use of a database or library to organize or store relevant physical activity, exercise, or sport information.

Website accuracy was examined for whether the Canadian Physical Activity Guidelines for Adults 18-64 years (or a similar international version) were used to structure the online information (Canadian Society for Exercise Physiology, 2011a). This set of guidelines is in line with international recommendations for physical activity set out by the World Health Organization (WHO) (WHO, 2010). Information was evaluated for providing frequency, intensity, and duration recommendations for both aerobic and resistance exercises. For aerobic exercises, we examined whether websites provided information on frequency (e.g., 3 to 5 times per week), duration (e.g., 30-60 minutes per session, or at least 150 minutes in total per week), and intensity (e.g., at a moderate or vigorous intensity). For resistance exercises, we examined whether websites provided information on frequency (e.g., at least 2 times per week), duration (e.g., 30-60 minutes per session, or enough time to complete exercises that involve different major muscle groups), and intensity (e.g., at a moderate to vigorous intensity). Use of guidelines

and whether specific recommendations were available for both types of exercises were rated on a dichotomous scale, where 0 = not present and 1 = present.

Technical quality was evaluated for overall information integrity using the Journal of the American Medical Association benchmark quality rating scale (Bonnar-Kidd et al., 2009; Silberg et al., 1997). Evaluated items of technical quality included: authorship, use of references, information currency, disclosures, endorsements by major institutions, and author contact details. Presence of each item was rated on a dichotomous scale, where 0 = not present and 1 = present. Scores of 4 or greater, out a possible 6 points, were considered high quality (Silberg et al., 1997).

Theoretical quality was examined for the use of behavioral theories to structure the online information. Research has shown that interventions to increase levels of physical activity based on behavior change theories have been shown to be more effective than those not based on any behavioral theory (Kahn et al., 2002). Constructs from the health belief model (Becker, 1974), the transtheoretical model (Prochaska and Velicer, 1997), the theory of planned behavior (Ajzen, 1985), and the social cognitive theory (Bandura, 1986) were grouped into three categories: knowledge dissemination, cognitive, and behavioral. Collectively, these behavior theories have been widely used to structure physical activity and exercise interventions (Kahn et al., 2002) and they represent a broad spectrum of constructs that have been shown to be associated with increased activity (Troost, Owen, Bauman, Sallis, & Brown, 2002). Knowledge dissemination explored the use of specific instructions to present physical activity, exercise, or sport information. Cognitive constructs included perceived benefits, perceived barriers, perceived risks, self-efficacy, self-talk, and perceived social norms. Behavioral constructs included modeling, social support, realistic goal-setting, motivational readiness, and self-monitoring.

Websites were examined whether they discussed the construct directly (i.e., ‘self-efficacy’, ‘self-talk’) or referred to the construct in another, similar manner (i.e., ‘confidence’ or ‘belief in self to achieve goal’, ‘self-regulation’ or ‘inner dialogue’). The presence of each construct was rated on a dichotomous scale, where 0 = not present and 1 = present. Theoretical quality was rated out of a possible score of 12 points.

Targeting strategies were evaluated for whether information was adapted for individuals of different ages and genders. Presence of each strategy was rated on a dichotomous scale, where 0 = not present and 1 = present. Targeting strategies were rated out of a possible score of 2 points.

The readability of the online information was evaluated for its syntax and syllabic structure using the Flesch–Kincaid Grade Level Formula [$0.39(\text{total words}/\text{total sentences}) + 11.8(\text{total syllables}/\text{total words}) - 15.59$] (Flesch, 1994). The Flesch–Kincaid Grade Level Formula provides a grade level equivalent to the United States grade level usually necessary to understand a particular text. For this review, the formula was used to evaluate the readability of the first multi-sentence paragraph of each website where information on physical activity, exercise, or sport was found. The Canadian Health Libraries Association recommends that health information should be written at a grade 6 to 8 reading level (Canadian Health Libraries Association, 2008).

Analysis

Each website was evaluated independently by the two study authors. After evaluating the websites independently, the authors then met to discuss each construct for each website.

Unweighted kappa coefficients for websites, a measure of inter-rater agreement, ranged from .33

to 1.0. Where disagreement existed on a particular construct, the authors reached a consensus.

Descriptive statistics are presented below and in Table 1.

Results

Descriptive characteristics

The majority of websites that provided relevant information on physical activity, exercise, and sport were hosted by companies affiliated with the trucking industry (40.9%). Other major sources of information were health (20.5%) and news agency (13.6%) websites. Information was also found on academic (2.3%), community-based (6.8%), independent (6.8%), and non-trucking commercial (9.1%) websites. Relevant information was directly accessible only through the main pages of 18 (40.9%) websites, where it took on average 1.7 clicks ($SD = 1.1$) to reach the desired content. For the 22 (50%) websites where a search box was provided on the main page, it took an average of 2.2 clicks ($SD = 0.4$), plus entering the search term, to reach the relevant information. Relevant information was not directly accessible through the main pages of four (9.1%) websites. For these websites, information was only accessible through a GOOGLE search. With respect to providing links to other websites that offer physical activity, exercise, and sport information for truck drivers, ten (22.7%) websites provided this option. On average, each of these websites provided 2.5 links ($SD = 2.3$). Overall, 33 (75%) websites offered some form of communication outlet to let users communicate and interact with each other. No websites offered any form of database or library or manner in which to organize or store physical activity, exercise, or sport information.

Website accuracy

Nine websites (20.5%) offered information based on physical activity guidelines. Each of these websites provided frequency and duration recommendations for aerobic exercise. Six (13.6%) websites offered information about recommended aerobic exercise intensity. No websites discussed guidelines for resistance exercise.

Technical quality

Scores for technical quality ranged from 1 to 5, with an average score of 2.7 (SD = 1.2). Ten websites (22.7%) received a score of at least 4 points, indicating that they were of high technical quality. The most frequent technical quality criterion identified was contact information (86.4%), followed by currency (61.4%), authorship (52.3%), use of references (40.3%), and disclosures (29.5%). Only one (2.3%) website received the endorsement of a major institution.

Theoretical quality

The average theoretical quality score for the reviewed websites was 3.5 (SD = 1.9). Most websites (86.4%) scored fewer than 6 points out of a possible 12 points. In order to facilitate knowledge dissemination, 30 (68.2%) websites provided instructions about physical activity, exercise, or sport. Perceived benefits and perceived barriers were the most frequently discussed cognitive constructs. Thirty-nine (88.6%) websites discussed the benefits of physical activity, exercise, and sport, while barriers were mentioned by 35 (79.5%) websites. Other cognitive strategies mentioned by websites included: perceived risks (18.2%), perceived social norms (6.8%), and self-talk (2.3%). No websites discussed self-efficacy.

Behavioral strategies were addressed less frequently than cognitive strategies. Modeling was the most frequently discussed behavioral technique to increase levels of physical activity or exercise. Seventeen (38.6%) websites mentioned this strategy. Eight (18.2%) websites discussed

goal setting, while seven (15.9%) websites addressed motivational readiness to begin any physical activity, exercise, or sport routine. Four (9.1%) websites recommended self-monitoring techniques to increase activity levels and only two (4.5%) websites suggested any form of social support.

Targeting strategies

Two (4.5%) websites addressed physical activity, exercise, and sport information specifically for women. Other websites provided information that was geared toward men. No websites provided age specific information.

Readability

The average grade reading level for websites included in this review was 9.7 (SD = 3.9). Twenty-eight (64%) websites had a grade reading level higher than 8. Websites that had grade levels of 8 or lower ranged from 4.8 to 8.0.

Discussion

The purpose of this study was to evaluate the accessibility, accuracy, technical and theoretical quality, and readability of online physical activity, exercise, and sport information for long-haul truck drivers. Overall, companies affiliated with the trucking industry hosted the majority of the online information for this population. Relevant information could be accessed in approximately two clicks and most websites offered some form of communication outlet. Regarding information accuracy, approximately a fifth of the websites provided information that was based on physical activity guidelines. No websites provided information that was based on guidelines for resistance training. On average, websites scored poorly on technical and theoretical quality. Cognitive strategies were discussed more frequently than behavioral

strategies, with perceived benefits of and perceived barriers to physical activity, exercise, and sport being the most frequently discussed cognitive constructs. Two websites offered information specifically for women and no websites provided age specific information. Most websites provided information that was higher than a grade 8 reading level.

To the best of our knowledge, no previous research has examined the quality of online physical activity, exercise, or sport information for long-haul truck drivers. Other reviews that have examined online physical activity, exercise, and sport information for other populations have found that most websites offer information that is of low quality and not associated with physical activity guidelines (Bonnar-Kidd et al., 2009; Gorczynski et al., 2013; Jetha et al., 2011). Additionally, researchers have found that few websites provide tailored physical activity information to users of different demographics and stages of motivational readiness, thereby limiting the potential health outcomes that may come as a result of the online content (Doshi et al., 2003).

Several strategies can be taken from the findings of this study to not only improve the quality of online physical activity, exercise, and sport information for this population but also online interventions aiming to increase levels of physical activity in long-haul truck drivers. First, information on websites should be visible, easy to find, accessible through no more than two clicks, and available without a search engine. Additionally, providing site maps or schematics that easily show the user where other related health information may be found can improve the overall user experience (Danielson, 2002; Graham, Tse, & Keselman, 2006). Specifically, these design strategies can help users to seek out more detailed information by allowing them to easily maneuver to and access other pages of the website (Danielson, 2002).

Overall, site maps may make it less likely the user will abandon the intended information search. For websites that provide information to long-haul truck drivers,, site maps may be a useful strategy to guide individuals to learn about dietary information or ways to reduce stress or other aspects of chronic disease prevention and management.

Second, steps should be taken to make websites more interactive. Researchers recommend increasing the number of opportunities for interaction amongst users by incorporating email exchanges, discussion boards, chat sessions, or online coaches (Vandelanotte, Spathonis, Eakin, & Owen, 2007). Increased interaction may enhance engagement in interventions and retention in online physical activity information. Interactive components on websites may also allow users to produce tailored and relevant physical activity or exercise recommendations.

Third, physical activity guidelines should be used to structure information about aerobic and resistance exercises. Websites should provide specific frequency, intensity, and duration recommendations for both exercises. Websites may wish to incorporate the F.I.T.T. (frequency, intensity, time, type) principles into their information and make tailored recommendations for their users (Beulac, 2011). Exercise recommendations should direct individuals to attain at least 150-min of aerobic exercise per week at a moderate or vigorous intensity plus at least two 30-60-min sessions of moderate to vigorous intensity resistance training that incorporates a broad range of muscle groups.

Fourth, online content should be based on health behavior change theories and models. Research has shown that theoretically designed physical activity and exercise interventions are more successful than those with no theoretical underpinnings (Kahn et al., 2002). Theoretically

informed website-delivered physical activity interventions have also been shown to be more efficacious at increasing levels of physical activity than those not explicitly based on any behavioral theory (Vandelanotte et al., 2007). Website designers can incorporate strategies that have been shown to be positively associated with increased physical activity and exercise, such as discussing one's confidence, goal setting strategies, social support systems, and self-monitoring.

Fifth, information should be of high integrity and in accordance with the Journal of the American Medical Association benchmarks. Specifically, attention should be paid to providing authorship details, references for information sources, the date the information was written or produced, any disclosures or conflicts of interest, endorsements by major institutions, and ways to contact the author of the information.

Sixth, information should be tailored for both men and women and age specific. Although less than five percent of long-haul truck drivers are women, the number of women entering the profession is growing and so is their need to receive health information and services (Krueger et al., 2007; Layne et al., 2009; Service Canada, 2012). Additionally, the majority of long-haul truck drivers are between the ages of 45 and 64 years (Service Canada, 2012), which is higher than other occupations. Approximately three percent of long-haul truck drivers are 65 years or older (Service Canada, 2012), requiring age specific information, especially on how to avoid falls (Canadian Society for Exercise Physiology, 2011b). Tailored information can enhance the user experience, minimize the risks of injury, and increase the likelihood individuals will change their behaviors (Bonnar-Kidd et al., 2009; Hawkins, Kreuter, Resnicow, Fishbein,

Dijkstra, 2008; Kreuter & Wray, 2003). Lastly, authors should ensure that all online content be at a reading level of 6 to 8 as suggested by the Canadian Health Libraries Association.

Several strategies were employed to identify and evaluate websites in a rigorous manner. Despite these rigorous methods, a number of limitations should be noted. First, the Internet is a constantly evolving medium. Information that was reviewed at the time of this study may have since changed or is no longer available. Second, variable kappa coefficients illustrate the difficulties of evaluating a constantly evolving medium and the need for reviewers to examine websites together and reach a consensus on each reviewed construct. Third, although a rigorous approach was taken to identify websites for truck drivers, other cultures may use different terms for this occupation, such as lorry drivers or haulers. Future studies and reviews should consider these other terms for truck drivers.

Increased levels of physical activity can reduce the chances of acquiring a chronic health condition but also lead to increased safety on the road. Given that truck drivers face extremely sedentary and obesogenic environments (Apostolopoulos et al., 2012b), the Internet presents one option of not only providing information about physical activity, but also stops where one can be physically active or find existing exercise facilities. Several strategies can be taken to improve the quality of online information about physical activity and the manner in which it is transmitted to long-haul truck drivers. Further research is required to examine whether online information accommodates different learning styles or makes use of other behavior change theories or models. Ultimately, randomized controlled trials are needed to evaluate the overall efficacy and effectiveness of online information in any behavior change program.

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Descriptive characteristics, Information Accuracy, Technical Quality, Theoretical Quality,

Targeting Strategies, Readability

Descriptive Characteristics	Number	Mean	%
Website Characteristics			
Trucking industry	18		40.9
Health	9		20.5
News Agency	6		13.6
Non-trucking commercial	4		9.1
Independent	3		6.8
Community-based	3		6.8
Academic	1		2.3
Accessibility (Number of clicks from main page)		1.7 (SD = 1.1)	
Accessibility (Number of clicks from main page if searched)		2.2 (SD = 0.4)	
Sites that offered other physical activity, exercise, or sport websites links for long-haul truck drivers	10		22.7
Number of other physical activity, exercise, or sport websites links		2.5 (SD = 2.3)	
Available communication outlets	33		75.0
Use of physical activity, exercise, or sports database	0		0.0
Information Accuracy			
Specific physical activity, exercise guideline recommendations	9		20.5
Aerobic Exercise - at least 150 minutes of moderate or vigorous physical activity per week			
Frequency	9		20.5
Intensity	6		13.6
Duration	9		20.5
Resistance Exercise - at least 2 times per week of comfortable intensity			
Frequency	0		0.0
Intensity	0		0.0
Duration	0		0.0
Technical Quality			
Authorship	23		52.3
Attribution or references	18		40.9
Currency	27		61.4
Website disclosure	13		29.5
Endorsements by major institution	1		2.3
Contact information	38		86.4

Descriptive Characteristics	Number	Mean	%
Theoretical Quality			
Knowledge Dissemination			
Physical activity, exercise instructions	30		68.2
Cognitive			
Perceived benefits	39		88.6
Perceived barriers	35		79.5
Perceived risks	8		18.2
Self-efficacy	0		0.0
Self-talk	1		2.3
Perceived social norms	3		6.8
Behavioural			
Modeling	17		38.6
Social support	2		4.5
Goal setting	8		18.2
Motivational readiness	7		15.9
Self-monitoring	4		9.1
Targeting Strategies			
Target age range	0		0.0
Target gender	2		4.5
Readability			
The Flesch–Kincaid Grade Level		9.7 (SD = 3.9)	

Appendix A. Websites included in the review.

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