Risk factors in road crossing among elderly pedestrians and readiness to adopt safe behavior in socio-economic comparison

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ABSTRACT

This research examines the Health Promotion Behavior (HPB) models regarding elderly pedestrians' behaviors and attitudes. We studied cognitive-psychological variables, such as risk estimation, self-efficacy and demographic variables and compared elderly pedestrians' attitudes and behaviors in a city with higher socio-economic level (Tel Aviv) versus a city with low socio-economic level (Beer Sheva). We expected to find more problematic behaviors among elderly pedestrians in the low socio-economic city compared to the high socio-economic city, and also less feeling of self-efficacy, and lessened awareness of the risks, that leads to lessened willingness to adopt preventive behaviors. The research was conducted in two studies. The first study was based on observations on 2591 pedestrians in six similar crosswalks in both cities. It revealed that pedestrians in the high socio-economic city demonstrated safer road crossing patterns than in the low socio-economic city and that elderly pedestrians reveal safer crossing patterns than younger pedestrians. We found an interaction of location and age due to greater gap of safe behaviors of elderly and young pedestrians in the high socio-economic city than in the low socio-economic city. In Tel Aviv elderly adhere to the crossing rules much more than the young while in Beer Sheva elderly and young people are almost similar in their crossing patterns. The second study used questionnaires that have been completed by 143 elderly in both cities. The questionnaires referred to (a) demographic variables such as gender, age, marital status, education, socio-economic level, (b) variables related to the affiliation to the main culture such as migration, date of migration, knowledge in Hebrew (local language) and connectivity to media and (c) cognitive as well as psychological variables related to the decline to adopt healthy behaviors based on Schwarzer and Fuchs (1995). This part also indicated that elderly in Tel Aviv have higher awareness of risk factors on the road and their limitations as elderly pedestrians. The HPB (Pender, 1996) emphasizes the role of risk perception as a predictor of willingness to adopt preventive strategies. Moreover, elderly pedestrians in Beer Sheva compared to those in Tel Aviv estimated their ability to cross safely the streets as higher.

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1. Introduction

Pedestrians are vulnerable road users all over the world. Twelve percent of the fatalities in road crashes are pedestrians (The U.S. Federal Highway Administration, 2014). Pedestrian injury rates in Israel are higher than in other Western countries with fatality rates as high as 33% the majority (65%) of pedestrian fatalities in Israel occurs in urban areas (Israel National Road Safety Authority, 2014). Demographic variables such as marital status, age, gender, educational level, income and vocational status were found in previous research as associated with the safety of pedestrians' road cross-

ing behavior (Dommes et al., 2015; Guéguen and Pichot, 2001; LaScala et al., 2000; Hamed, 2001; Rosenbloom, 2006). Parenthood was found to be related to pedestrian behavior, as parents take fewer risks at crossing than non-parents (Hamed, 2001). Personality characteristics also have been shown to be associated with risky behavior at crossing. For instance, sensation seekers seek more risks at crossing than sensation-avoiders (Rosenbloom and Wolf, 2002). Also, cultural values can predict risk taking at crossing, such that religious pedestrians were found willing to take much more risks than irreligious pedestrians (Koubenan, 1998; Rosenbloom et al., 2004).

Situational variables may also dictate pedestrians' inclination to take risks in road crossing. Hamed (2001) found that people that hurry to work take more risks at crossing than others. The familiarity level of the pedestrians with the neighborhood matters also when pedestrians are going to cross street unsafely (Blatt

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and Furman, 1998). Other situational variables associated with safe crossing were mobile phone use (Nasar et al., 2008) and the presence of law enforcers in the vicinity (Rosenbloom, 2006). Pedestrian behavior also varied in accordance with the type of vehicle approaching, as they attempted crossing the road more often when approached by private vehicle, than when approached by a heavy vehicle (Hamed, 2001).

Elderly pedestrians are much more susceptible to being injured or killed in road accidents than other road users. Their probability of being hurt while crossing the street is about three times higher compared to younger people (Israel National Road Safety Authority, 2013). Studies identified several factors involved in this phenomenon, relating either to the physical health of the elderly person, such as deterioration in hearing and in eyesight, or to the psychological and cognitive condition, such as poor decision making, difficulty in processing complex information, and difficulty in risk assessment (Daigneault et al., 2002; Koepsell et al., 2002; Oxley et al., 1995; Zafar et al., 2014). Zakay (2001) investigated road crossing behaviors and related attitudes of the older population, and found that they were unaware of the age risk factors on the road, and overestimated their ability to cross the road safely. He also found that many of them wanted to attend road safety training, but did not have the opportunity to do so because of the absence of training programs. Liu and Tung (2014) also found that elderly people tend to make risk assessments of the road crossing situation that don't take into consideration their deterioration in walking ability, putting them in higher risk to getting hit by a car. These findings demonstrate the importance of guiding the elderly population to make more accurate risk assessments of their road crossing abilities, and bringing into their awareness the need to adopt preventive coping strategies.

Studies that examined the effectiveness of training programs for safety and health promotion have shown that programs that were based on psychological and sociological models were more efficient in enhancing safety behaviors than others (Stalvey and Owsley, 2003). Other programs improved relevant knowledge and attitudes, but had no influence on the adherence to safety behavior. One of the models that have been used extensively in public health related studies is Pender's Health Promotion Behavior model- HPB (Pender, 1996; Pender et al., 2002). This model has been applied to a large range of health promoting issues, such as dieting and healthy eating, exercising, promoting nursing, stopping smoking, safe sexual behavior, and safety in the work (Chenchop, 2011; Padden et al., 2013; Schlickau and Wilson, 2005). This model offers several variables that influence the individual's willingness to adopt a healthy and safe life style. Some of the variables are cognitive and psychological, and some are sociological-demographic. The model was based on Bandura's *Social Cognitive Theory* (Bandura, 1986, 1996), and on Feather's Expectancy Value Theory (Feather, 1982). According to the HPB model, among the psychological and cognitive variables that influence the adoption of health and safety behaviors are risk estimation, self-efficacy assessment, the expected outcome, and the perceived barriers (Padden et al., 2013; Pender, 1996; Ywun et al., 2013). According to this model people will be more willing to adopt healthy and secure behavior if they perceive high risk in neglecting the preventive behavior, and also if they have high self-efficacy in learning and implementing the new behavior. In addition, the model suggests several social and demographic variables that are associated with the willingness to adopt health promoting behaviors, such as age, gender, socioeconomic status, immigration, education level and feeling of relatedness to the main culture.

According to the HPB (Kwnog and Kwan, 2006; Pender et al., 2002; Schlickau and Wilson, 2005) any intervention program should include the following steps: (a) raising of awareness to risks, basing of realistic perception of risk and the ability to reduce risks by adopting preventive behaviors; (b) basing a positive and realistic self-efficacy to adopt preventive behaviors and (c) teaching new behaviors by practice. Bandura (1986, 1994) emphasizes that each training program should be fit to the level of awareness of most people in the community.

The HPB model also suggests that training programs should be sensitive to the needs and norms of the community (Pender et al., 2002; Schlickau and Wilson, 2005). If the risk assessment or the self-efficacy is low the training should start by bringing the risks to awareness and strengthening the self-efficacy feeling, and then go to the practice stage. Otherwise, if there is a realistic risk assessment and good self-efficacy, the training can begin at the practice stage (Kwong and Kwan, 2006). Studies have found more willingness to adopt health preventive behaviors among higher socio-economic population, especially among individuals with higher education level (Lantz et al., 1998; Pender et al., 2002; Schlickau and Wilson, 2005). With regards to gender and age influences, research has found that women are more likely than men to participate in health promoting behaviors (with the exception of doing physical exercise which is higher for men). Women were found to be more aware of health risks leading them to be more willing to adopt preventive behaviors (Courtenay, 1998a; Courtenay, 1998b; Courtenay, 2000; Kwnog and Kwan, 2007). Differences among age groups in adopting health behaviors were also found, with the elderly group tending to have a healthier life style compares to the middle-aged and the young adults groups (Walker et al., 1988). The exception was engaging in physical exercise which found to be lower in the elderly population (Vicki, 1998).

A large range of studies examined the HPB Model in relation to health habits and diseases prevention, nonetheless there are only few studied that applied the model to the traffic field, most of them concerning drivers' behaviors. Stalvey and Owsley (2003) found that a training program for elderly drivers based on Social Cognitive Theory was efficient in adopting preventive behavior of risk management on the road. The training caused the drivers to be more aware of their eyesight deterioration, and to perceive more benefits in applying preventive behaviors. Elliott and Long (2008) found that predictors of safer driving behaviors among patients with epilepsy were ethnicity, employment status, perceived susceptibility, perceived barriers to changing driving behavior, and self-efficacy. Rosenbloom et al. (2011) found that risk estimation for being injured in an accident was correlated with pedestrians' behavioral norms at the road.

The innovation of the current study is in examining the HPB models regarding elderly pedestrians' behaviors and attitudes. We studied cognitive-psychological variables, such as risk estimation and self-efficacy, and also demographic variables. Demographic differences were examined by comparing elderly pedestrians' attitudes and behaviors in a lower socioeconomic status city and a higher socioeconomic status city.

We examined elderly pedestrians' risk assessments and self-efficacy feelings, and observed natural crossing behaviors in two big cities in Israel, the first, Tel-Aviv, is located in the center of the country, and is defined by the Israeli central bureau of statistics (CBS) as a high socioeconomic status city (cluster 8 of 10) while the second, Beer-Sheva, is a big city, located in the south region of Israel, and is defined by the CBS as a low socioeconomic status city (cluster 5 of 10). In Tel-Aviv live 57,000 elderly people (age above 65 years old), that are 15 percent of the population. In Beer-Sheva there are 22,000 elderly that are 12 percent of the population. Fifteen percent of the elderly in Tel-Aviv compared to 48 percent of the elderly in Beer-Sheva receive welfare benefits. Also, in Tel-Aviv 12 percent of the elderly population are new immigrants, while in Beer-Sheva 39 percent (Myers-JDC-Brookdale, 2006). Sociological theories suggest that social hierarchies are often represented in the organization of the local and geographical space (Dahan-Kalev