

SOCIAL INFLUENCE AND PHYSICAL ACTIVITY
IN OLDER FEMALES:
UNDERSTANDING CHANNELS & TYPES

A Thesis Submitted to the College of
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ABSTRACT

The purpose of this study was to explore the channels and types of social influence that may be associated with physical activity in older females. The study used a mixed methods design. First, a qualitative study was used to confirm the channels and types of social influence perceived by older females as being important. The channels and types of social influence identified were then used to construct a questionnaire that was used in the second study to explore how the channels and types might be related to different levels of physical activity.

In Study One, two focus groups were conducted with a total of 15 participants. During the focus groups, participants completed a circle map of influences relating to physical activity and then discussions followed using a semi-structured interview guide. These discussions were analyzed to verify the main channels and types of social influence. Three main channels were discussed: influences from family, friends, and healthcare workers. In terms of types of influence, obedience, compliance, conformity, and modelling were all mentioned in conjunction with at least one of the channels during the focus groups.

In Study Two, 145 older females completed the Older Adult Exercise Status Inventory (OA-ESI; O'Brien-Cousins, 1996) along with a questionnaire designed specifically for this study to assess social influence channels and types. Factor analysis of the social influence items revealed five factors: family; friends – obedience/compliance; friends – modelling; healthcare workers – obedience/compliance; and healthcare workers – modelling.

These five influence factors and perceived health were included in a discriminant function analysis to predict level of physical activity. Results revealed a significant function (Wilks' lambda = 0.806, $\chi^2(6) = 18.38, p = 0.005$), which explained 19.4% of the variance and correctly classified 70% of the sample. Perceived health and friends – obedience/compliance loaded with the active group (≥ 3 KKD; $N=58$) whereas family influence loaded with the insufficiently active group (≤ 2 KKD; $N=32$). These two studies provide preliminary support for the importance of channels and types as they relate to physical activity in older females. However, further research needs to explore these influences along with refining the social influence questionnaire developed for this study.

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INTRODUCTION

1.1 Introduction

Physical activity has been shown to have a beneficial effect on health through the prevention of various diseases, such as hypertension (Whelton, Chin, Xin, & He, 2002), coronary heart disease (Kohl, 2001), diabetes (Diabetes Prevention Program Research Group, 2002), osteoporosis (Snelling, Crespo, Schaeffer, Smith, & Walbourn, 2001), and breast and colon cancer (Lee, 2003). Given the prediction that the majority of the elderly may eventually end up with a chronic disease (Fried, Bandeen-Roche, Kasper, & Guralnik, 1999; Iron, Manuel, & Williams, 2003), physical activity may be especially important among older adults as a preventive measure.

Exemplifying its preventive nature, physical activity has been found to reduce morbidity and mortality. Not only does a physically active individual live longer but he or she also is more likely to be relatively free from disability for a longer period of time as compared to a sedentary individual (Schroll, 2003). In females, the expected life span is 81 years with a disability-free life expectancy of 70 years of age (Statistics Canada, 1996), suggesting that older females will have a disability for 13.5% of their life (11 years troubled by a disability). This discrepancy between the disability-free life expectancy and the expected life expectancy provides impetus for creating objectives to improve the health of the elderly (Colvez, 1996). Specifically, it is important to look at ways of reducing this period of morbidity in order to improve the quality of life of these individuals.

As suggested above, physical activity may be one way to reduce this period of morbidity. Physically active females extended their disability-free life expectancy by 6.0 years when compared with their physically inactive counterparts, and this increase accounted for the majority (85%) of their increase in total life expectancy (Belanger, Martel, Berthelot, & Wilkins, 2002). This suggests that physical activity may be one important way to reduce the period of morbidity prior to death as well as aiding in the prevention of chronic diseases such as coronary heart disease (Kohl, 2001) and diabetes (Diabetes Prevention Program Research Group, 2002).

Notwithstanding the fact that the benefits of physical activity are numerous, physical inactivity is highly prevalent, with more than two thirds of females over 65 years of age not being active enough for health benefits (Cameron, Craig, Stephens, & Ready, 2002). In addition to the high levels of physical inactivity among elderly, Canada's population is aging, with older adults (over 50 years of age) expected to grow from about 30% of the population in 2001 to over 40% of the population in 2026 (Statistics Canada, n.d.). When this trend toward an aging population (Statistics Canada, n.d.) is coupled with the increased prevalence of physical inactivity with increasing age (Cameron et al., 2002), it suggests that our attention should focus on this population and explore ways to increase physical activity in the elderly.

While there are different ways to increase the physical activity levels of the elderly, one tact may be to focus on the influence of others. We are immersed within a society that requires interaction between individuals. In fact, it has been suggested that the need to belong is a fundamental aspect of human nature (Baumeister & Leary, 1995) and our interactions with others can have an impact on how we behave (Baron &

Bryne, 1981). Thus, understanding how these social interactions can influence our own individual behaviour becomes important.

In previous research with older adults, social interactions have been identified as being associated with physical activity behaviour. Social variables such as social support have been found to be a correlate of physical activity in the elderly (Kaplan, Newsom, Bentson, McFarland, & Lu, 2001). As well, social variables have been found to contribute more to the intention to exercise for seniors than young adults (Wankel, Mummery, Stephens, & Craig, 1994). Further exploration of social variables may help develop an understanding about ways to promote physical activity in older adults. Social influence, which looks at how individuals are influenced by others to change their actions, feelings and thoughts (Turner, 1991), is one such construct that may allow us to explore how our physical activity behaviours are influenced by others.

1.2 Social Influence

Social influence “comprises the processes whereby people directly or indirectly influence the thoughts, feelings, and actions of others” (Turner, 1991; p.1). Another definition of social influence “refers to any actions performed by one or more persons to change the attitude, behaviour, or feelings of one or more others” (Baron & Byrne, 1981; p. 229). Common to both of these definitions is the notion of others playing a role in altering the behaviours, thoughts, and feelings of another individual.

Research examining social influence in the physical activity area has focused typically in three areas: social support, cohesion, and subjective norms (Carron, Hausenblas, & Mack, 1996). Social support is one of the most common types of social influence examined within the physical activity domain (Chogahara, O’Brien-Cousins,

& Wankel, 1998). It may be described as the comfort, assistance or information that an individual receives from the interaction with individuals or groups (Wallston, Alagna, DeVellis, & Devellis, 1983). In a meta-analysis, social support was found to have a small to moderate effect on exercise behaviours such as adherence and compliance (Carron et al., 1996).

Social support has been explored within exercise programs for previously sedentary middle-aged and older adults. It has been reported that increased perceptions of social support have been found to predict increased attendance and adherence either directly or indirectly via self-efficacy (Duncan, Duncan, & McAuley, 1993; Duncan & McAuley, 1993; Duncan, McAuley, Stoolmiller, & Duncan, 1993; Oka, King, & Young, 1995). Cross-sectional research also has shown that greater perceptions of social support have been related to physical activity in older adults (Kaplan et al., 2001) and older females (O'Brien-Cousins, 1995) as well as the decreased likelihood of being sedentary in middle- and older-aged women (Eyler et al., 1999). However, in the study by Eyler and colleagues, social support was not predictive of performing regular exercise (5 times per week for 30 minutes), suggesting that social support may be related to physical activity variables in different ways. In addition to being related to physical activity behaviours, social support in older adults also has been linked to greater feeling states, more positive affect, and self-efficacy to overcome barriers (McAuley, Jerome, Marquez, Elavsky, & Blissmer, 2003).

Another commonly examined social influence in the physical activity literature is cohesion, which is defined as “a dynamic process that is reflected in the tendency for a group to stick together and remain united in the pursuit of its instrumental objectives

and/or for the satisfaction of member affective needs” (Carron, Brawley, & Widmeyer, 1998). Within exercise classes of young and middle-aged adults, cohesion has been linked to improved exercise adherence behaviours such as attendance and reductions in lateness and drop outs (Spink & Carron, 1992; 1994). Other studies have extended this positive relationship between cohesion and physical activity to include the elderly population (Estabrooks & Carron, 1999a; 1999b). Specifically, with elderly exercise groups, cohesion has been shown to be positively related to attitudes towards exercise (Estabrooks & Carron, 1999a) and attendance (Estabrooks & Carron, 1999b). Within the exercise setting including older adults, both task and social cohesion have been consistently found to have a small to moderate effect on adherence behaviours (Carron et al., 1996).

The third type of social influence that has been commonly examined in physical activity settings is subjective norms, which refers to the perceived pressure to behave or not behave in a certain manner (Ajzen, 1991). Greater perceptions of subjective norms have been positively related to intention to exercise as part of the theory of planned behaviour (Hagger, Chatzisarantis, & Biddle, 2002). Subjective norms along with attitudes and perceived behavioural control are theorised to predict intention, which in turn, predicts behaviour. Specifically, in older adults, the theory of planned behaviour including subjective norms has been found to predict intention and to a lesser extent behaviour (Michels & Kugler, 1998). However, not all studies show support for the impact of subjective norms on physical activity behaviours (Smith & Biddle, 1999).

Even though these three types of social influence have formed the focus of research in physical activity settings, there are some limitations associated with their

use. For one, cohesion involves only the influence received from a group as it is a group process (Carron et al., 1998). Since not all exercise behaviour occurs within the group exercise setting, cohesion cannot be applied to physical activity behaviour that occurs outside of group settings. Similar to cohesion, much of the research on social support has looked at the social support provided within a particular exercise group (Duncan, Duncan et al., 1993; Duncan & McAuley, 1993; Duncan, McAuley et al., 1993; Oka et al., 1995), highlighting the group focus once again. Finally, although subjective norms have been related to the intention to be physically active, they have not been consistently related to actual physically active behaviours (Smith & Biddle, 1999). In addition, these three social influences have generally only had a small to moderate effect on exercise behaviours, cognitions, and affect (Carron et al., 1996). Given these limitations, one wonders whether other forms of social influence may be able to explain additional variance in physical activity behaviour.

Social influence can occur in many ways. In research areas outside the physical activity realm, most studies on social influence focus on four other types of social influence, which include obedience, compliance, conformity, and modelling (Baron & Byrne, 1981). Exploring how these four types of social influence relate to physical activity behaviours may be important given that these other types of influence have been found to play a role in numerous other health behaviours such as smoking (West & Michell, 1999), dieting (Strong & Huon, 1998), and drinking and seatbelt use (Lau, Quadrel, & Hartman, 1990).

As mentioned above, social influence can be manifested in a number of different forms or types. Each of the four types identified above will be explained in

the following section. In each section, the type of social influence will be described first. This will then be followed with some examples of how the type of social influence has emerged in the physical activity area.

1.2.1 Types

1.2.1.1 Obedience

The first type of social influence is obedience and involves responding to a command from another individual (Milgram, 1963). In the classic study examining obedience, Milgram (1963) investigated how much shock a naïve participant would administer to an accomplice before disobeying that order from the experimenter to continue administering the shocks. Despite protests from the accomplice receiving shocks, the majority of the participants administered the maximum amount of shock suggesting the powerful nature of obedience in influencing behaviour. Surprised by the large number of participants obeying the researcher, Milgram (1963) continued with a series of experiments evaluating different variables that might alter the rate of obedience. When an ordinary person rather than the experimenter provided the orders to continue, the rate of disobedience increased (Milgram, 1974), suggesting that the authority of individual issuing the orders was important. Consistent with the previous study, other studies examined characteristics related to an authority figure and found meaningful relationships to obedience rates (Blass, 1991). For instance, authority based upon social position (i.e., teacher) or knowledge base (i.e., trained student) was perceived by children as more important than authority based upon adult stature (Laupa, 1991).

It might be speculated that this relationship between authority and obedience might be manifested in the influences on the physical activity behaviours of older adults. For instance, a physician is a figure who is often perceived as being an expert with regard to health care, and as such, may be seen as an authority figure in this area. In fact, it has been reported that physicians can be a source of advice for information on physical activity (Booth, Bauman, Owen, & Gore, 1997). Following a coronary event, physician referral has been mentioned as a reason why women attend a cardiac rehabilitation program (Gallagher, McKinley, & Dracup, 2003). As illustrated above, it appears as if examples of obedience have been observed within the physical activity literature.

1.2.1.2 Compliance

Another type of social influence studied in social psychology is compliance (Baron & Byrne, 1981). It is a form of social influence in which the individual acts in accordance with another individual's wishes (Kelman, 1961). This often involves acting in response to a request (Freedman & Fraser, 1966). Freedman and Fraser were among the first to investigate compliance and the various factors that lead to increased compliance. For instance, the 'foot-in-the-door' technique was employed where an initial small request was followed by a second larger request to change behaviour. Participants who performed the initial request were more likely to perform the second larger request in two different experiments (Freedman & Fraser, 1966).

Research in the area of social psychology has looked at ways to improve the effectiveness of compliance as a type of social influence. For example, researchers found that when participants performed a task that either peaked their interest or made

the participant feel guilty, the rate of compliance improved (Rind, 1997). Other studies have investigated the relationship between the sender and the receiver of the request (Burger, Soroka, Gonzago, Murphy, & Somervell, 2001). Spending time with the sender or sharing similarities with the sender made the receiver more likely to comply with the request (Burger et al., 2001). This suggests that knowing the individual making the request (e.g., a friend) may be a stronger source of influence than receiving the same request from a stranger or someone with whom the participant has less familiarity.

Within the physical activity setting, there are examples of compliance as a type of social influence. For example, when an individual begins an exercise regime on the basis of a suggestion from a healthcare practitioner, social influence in the form of compliance has occurred. Receiving a physician's advice toward exercise and diet has been found to be associated with attempts by individuals to change their behaviour (Thomas et al., 2002). Further, receiving a written prescription for exercise in addition to verbal advice from a physician has been associated with improvements in physical activity behaviours including duration and intensity (Pfeiffer, Clay, & Conatser, 2001; Swinburn, Walter, Arroll, Tilyard, & Russell, 1998).

1.2.1.3 Conformity

A third type of social influence is conformity, which involves acting in line with the group norms (Asch, 1956). A group has certain expectations for its members and all members may behave in a similar manner and these, in combination, establish norms. In order to conform to the group's norms, individuals may perform the behaviour expected by the group, and therefore their behaviour may be influenced.

In one of the classic studies examining conformity, Asch (1956) created a situation where participants were estimating the sizes of lines and the majority of the group (i.e., confederates) provided the wrong answer creating a norm that was incorrect for the response. Naïve participants were then evaluated as to whether they would go against what they perceived to be correct and conform to the group's norm, or act independently and provide the correct answer. Asch found that although not everyone conformed, the frequency of errors in the group where the norm for the incorrect answer was created was much larger than a comparison group.

Further research in the area of conformity has looked at other behaviours such as littering (Cialdini, Kallgren, & Reno, 1991), recycling (Schultz, 1998), and drop out from college (Bank, Slavings, & Biddle, 1990). When examining littering, a descriptive norm showing what other people do, by having an area that contained litter, was associated with a greater prevalence of littering by the participants (Cialdini et al., 1991). In addition, injunctive norms, which involve the approval or disapproval of behaviours, were also found to be related to littering behaviour (Cialdini et al., 1991). In another study, feedback concerning the amount of recycling done, which was indicated by a group norm, was found to be related to more recycling behaviours in individual members (Schultz, 1998). When predicting whether students would drop out of college, normative influences from parents, peers, and faculty were found to be significant predictors (Bank et al., 1990).

Group or normative pressure from others has been investigated as it relates to adherence and intention within the physical activity context. As discussed previously, subjective norms, which are a part of the theory of planned behaviour (Ajzen, 1991),

have been found to predict exercise intention and behaviour in older adults (Michels & Kugler, 1998). Group pressure exerted by friends who exercise together has been mentioned as a factor that is related to adherence to an exercise regime for non-active young women (Lindgren & Fridlund, 1999). As can be seen, in some instances, conformity has been related to a variety of physical activity behaviours.

1.2.1.4 Modelling

A fourth type of social influence, modelling, is less directing because the source is typically not trying to influence the receiver. Modelling involves learning a behaviour by observing others (Bandura, 1977). As part of the social learning theory, observing another provides information with regard to the action to be performed, which is then stored and performed later (Bandura, 1977). Bandura (1977) describes four processes that are necessary for a model to be effective. First, the learner must attend to the model, which can be related to the characteristics of the model or the relationship that the individual has with the model. Secondly, the individual must be able to retain or remember the behaviour that has been modelled. Third, the learner also has to be able to convert these representations of behaviour into the actual behaviour itself, in that the participant must be physically able to perform the behaviour. Finally, the learner has to be motivated to perform the behaviour and this is often developed through observed consequences and how effective these behaviours are for the model.

Initial studies in the area of modelling were conducted with children. One of the earlier studies examined the effect of a model aggressing a 'Bobo' doll on young children (Bandura, Ross, & Ross, 1961). The children were later placed in a similar

room and their aggressive behaviour was evaluated. In this case, young children were found to perform the same aggressive behaviours that were exhibited by models when compared to children who observed a non-aggressive model or a control group.

Beyond these earlier studies, other research has looked at the effect of peer and parental modelling on specific behaviours. Modelling of behaviours for smoking and alcohol use by friends was found to be a predictor of smoking and alcohol use (Graham, Marks, & Hansen, 1991). Parents and peers modelling behaviours have been found to have a significant effect on a variety of preventive health behaviours including drinking, eating, wearing seatbelts, and exercise (Lau et al., 1990).

While modelling has generally been shown to influence behaviour within social psychology, studies also have investigated the influence of modelling within the physical activity context. Self-reported physical activity behaviour of adolescents was positively related to both parental and peer models of physical activity (Prochaska, Rodgers, & Sallis, 2002). Seeing others exercise was a predictor of African-American women performing physical activity at recommended levels (Sanderson et al., 2003). Having family and friends exercise regularly also has been found to be related to participating in physical activity (Booth, Owen, Bauman, Clavisi, & Leslie, 2000; Giles-Corti & Donovan, 2002).

Although we see these other types of social influence emerge individually within the physical activity literature, Spink (2003) was the first to examine the presence of obedience, compliance, conformity, and modelling collectively within the physical activity context and found that all were present in an adolescent population. Using an open-ended questionnaire, adolescents were asked if anyone had done or said

anything to get them involved in physical activities and then participants were cued to elaborate and specify on who and how. Responses were then coded and all four types of social influence (i.e., obedience, compliance, conformity, and modelling) emerged. In addition, three channels of influence emerged: family, peers, and significant others. In relating these responses to physical activity, Spink (2003) found that when social influences were present, the participant was more likely to be active. However, to-date, these different types have not been examined collectively in other populations including an older adult population.

1.2.2 Channels

Thus far, the focus has been on describing different types of social influence. However, to focus exclusively on the type of social influence may not be providing the whole picture. As illustrated in some of the examples provided in the previous section, the individual (e.g., doctor versus friend) associated with the social influence also may play a very important role in the effect that the social influence type has on the individual's behaviour. Further, each of these types of social influence can come from a variety of different sources, which have been termed channels (Spink, 2003).

Research has illustrated that the different channels may be more or less important depending on the situation. For instance, sources that are seen as more credible (e.g., a medical doctor) as compared to less credible (e.g., high school student) have been associated with more positive exercise intentions (Jones, Sinclair, & Courneya, 2003). In individuals with cancer, the importance of different channels is revealed by desire to receive different social supports from different individuals such as family, friends, and health professionals (Rose, 1990).

In terms of specific channels in the physical activity setting, family is one channel that has often been found to have an effect on adherence behaviours within an exercise setting (Carron et al., 1996). In a study by Oka and colleagues (1995), for instance, the researchers showed that with older adults, support from family for exercise was positively related to exercise behaviour. Also with older adults, Chogahara (1999) found that both positive and negative influences from family were important predictors of levels of physical activity. Influences received from family, in the form of social support, have been consistently related to physical activity (Troost, Owen, Bauman, Sallis, & Brown, 2002) and emerge as a main channel from the literature with regard to social influence in adults.

Another social influence channel that has been consistently related to physical activity is social support received from friends or peers (Troost et al., 2002). The influence of friends has been linked to physical activity behaviours including adherence in a variety of populations including adolescents (Prochaska et al., 2002), young women (Lindgren & Fridlund, 1999), older adults (Elward, Wagner, & Larson, 1992), and older females (Poole, 2001). Within older adults, a senior's number of friends has been related to participation in physical activity (Elward et al., 1992). In addition, the development of friendship with fellow exercisers has been mentioned as important for older women to continue to exercise (Poole, 2001).

Seniors also believe that healthcare professionals are a good channel from which to receive information concerning physical activity (Afonso, Graca, Kearney, Gibney, & De Almeida, 2001). Older adults often mention that health professionals are their preferred source of support with regard to increasing physical activity (Booth et al.,

1997). Research in the area of physicians counselling their patients about physical activity also has been investigated with regard to changes in self-efficacy (Pinto, Lynn, Marcus, DePue, & Goldstein, 2001), fitness (Petrella, Koval, Cunningham, & Paterson, 2003) and changes in physical activity itself (Elley, Kerse, Arroll, & Robinson, 2003).

Several studies have included multiple sources of influence when examining older adults, which allows for the comparison between different channels of influence. O'Brien-Cousins (1995) investigated the sources of support for elderly women by looking at encouragement from family, physicians, friends, or significant others. Although all channels had a significant effect on exercise behaviour, having friends involved in physical activity was the strongest predictor. Chogahara (1999) demonstrated that family, friends, and healthcare professionals all influenced older adults' physical activity behaviour in a different manner, whether it was in the strength of the influence or if the influence was positive (e.g., providing support in the form of information or companionship) or negative (e.g., inhibiting participation by advising against physical activity). In contrast, Eyler and colleagues (1999) separated support from friends and family and showed no difference in the contribution of the two channels in the prediction of exercise in middle- and older-aged females. With some studies showing different effects for various channels (Chogahara, 1999; O'Brien-Cousins, 1995) and another showing no difference between family and friends (Eyler et al., 1999), it is unclear whether the impact that each channel will have upon physical activity will be the same as other channels or different, suggesting the need for future research.

1.2.3 Channel X Type Interaction

In addition to the suggestion that different types and channels of social influence may have independent effects on physical activity behaviour, there also is the possibility of a channel-type interaction, where different types of social influence may be more influential when they come from different channels. When trying to interpret open-ended responses, Spink (2003) observed that different channels and types were associated with different levels of physical activity in youth and adolescents. For example, peer compliance was a stronger predictor of physical activity behaviour in the form of energy expenditure than was family compliance. In a study in another setting, which examined parental and peer influence in young adults, Bank and colleagues (1990) reported that modelling by parents had a positive effect but modelling by peers had a negative effect on persistence of behaviours with regard to college attendance. These examples suggest that the interaction between the channel and type may play a role in determining the effect of the social influence on behaviour, and as such, formed a focus for this study.

As the above examples illustrate, it appears as if the effect of the social influence type may not be the same for all channels, suggesting an interaction between channel and type. From an intuitive perspective, it appears as if other interactions also might exist. For instance, when looking at obedience, the authority status of a channel may be important (Blass, 1991). Examples of this might include health care practitioners (e.g., physicians) who may have authority status due to their social position and knowledge surrounding health concerns. Given this status, it might be

expected that channels such as these might be more influential in changing behaviour than channels with less perceived status (e.g., friends).

When examining compliance, it also is possible that different channels may have a different effect on individual behaviour due to their similarity or time spent with the individual (Burger et al., 2001). As friends tend to spend a lot of time together, this might make this a stronger channel for behaviour change through compliance than a channel such as health care practitioners.

Conformity involves relating to the group's expectations or norms (Asch, 1956). For this to occur, the individual must identify with the group. If it can be assumed that individuals have a stronger bond with their family and friends, this may result in the individuals being more inclined to change their behaviour to conform to these channels than with other channels to which there is less identification (e.g., physicians).

In terms of modelling, research has demonstrated that characteristics of the model (i.e., channel) may influence the outcomes of modelling. For instance, Gould and Weiss (1981) reported that performance outcomes were enhanced when individuals viewed a similar (i.e., similar to the observer) versus a dissimilar model. Extending this example, it might be speculated that behaviour change is most likely to occur through modelling when the model appears similar to the observer (e.g., another elderly female with a chronic condition) versus a less similar model (e.g., young healthy family member). These examples provide some support for the suggestion that the interaction between channels and types of social influence may be important to examine in the area of physical activity behaviour change.

1.3 Physical Activity

As discussed previously, physical activity is important for the prevention of chronic diseases as well as the maintenance of physical functioning. Physical activity is defined as any bodily movement that requires the expenditure of energy (Caspersen, Powell, & Christenson, 1985). Physical activity has been investigated using a variety of outcomes ranging from frequency (i.e., attendance measures) to energy expenditure. Energy expenditure is a measure of physical activity that can be tied into health benefits as an expenditure of 3 kilocalories/kilogram/day (KKD) is thought to be necessary to achieve cardiovascular health benefits (Craig, Russell, Cameron, & Beaulieu, 1998). As interest in this study was focussed around physical activity as a health-enhancing behaviour, energy expenditure was the outcome measure of physical activity selected for assessment in this study.

1.4 Older Females

Social variables are related to physical activity in older adults. However, several studies have found differences in the relationship among social variables and physical activity between older males and older females (De Bourdeaudhuij & Sallis, 2002; Kaplan et al., 2001). For instance, although social variables predicted physical activity for both older males and females, norms were related to physical activity in older males but were not significant among the older females (De Bourdeaudhuij & Sallis, 2002). Another study found that social support was a significant predictor of physical activity for older females, but not older males (Kaplan et al., 2001). These differences in findings between older males and females suggest that different social

factors may be important for each gender, so it is important to investigate the genders separately.

Females, especially older females, are more likely to be physically inactive compared to their male counterparts (Cameron et al., 2002). Females are not only more likely to be inactive, but they also have a larger discrepancy between their disability free life expectancy and the total life expectancy, suggesting a longer period of time for disability (Statistics Canada, 1996). These facts, in combination, support the importance of exploring ways in which to increase physical activity and reduce this period of morbidity in older females.

1.5 Specific Aims

A recent study with youth reported that all four types of social influence - obedience, compliance, conformity, and modelling - were related to energy expenditure (Spink, 2003). One goal of the present study was to extend these findings from a sample of youth (Spink, 2003) to an older female sample. The general purpose of this study was to explore the relationship between social influence channels and types and physical activity behaviour in older females. This mixed methods study was conducted in two parts using a sequential exploratory design (Creswell, Plano Clark, Gutmann, & Hanson, 2003), in which the priority of the design was the quantitative phase (see Figure 1 for a diagram of the overall design). The first part of the study was qualitative in nature. The intent of this first part was to explore whether the channels and types of social influences that have been identified previously in the general social influence literature as well as with another population (Spink, 2003) would emerge as influences impacting upon the physical behaviours of older females. More specifically, the

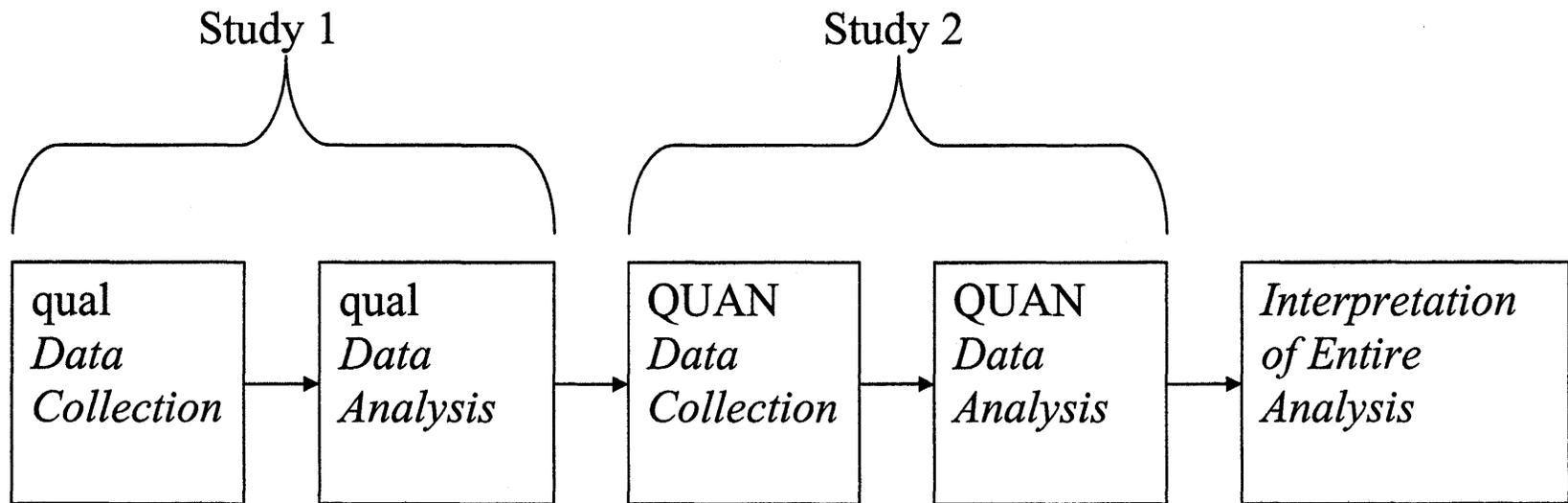


Figure 1.1: Overall Study Design (Creswell et al., 2003)

purpose of the first study was to develop an understanding of whether the previously identified social influences (channels and types) were important in older females in relation to physical activity. A basic qualitative inquiry was used to explore this phenomenon using the participants as active agents in this process (Merriam, 2002).

The results from Study One were used to develop a questionnaire to assess the impact of the emergent social influences on the physical activity levels of older females. Specifically, this second study used a cross-sectional survey method to assess the relationship between social influence channels and types and leisure-time energy expenditure in older females. From the channels and types identified in Study One, a questionnaire was developed to measure social influence (channels and types). This questionnaire was then administered in conjunction with a questionnaire assessing physical activity levels to older females to examine the relationship between social influence (channels and types) and level of physical activity. The salient channels and types from Study One were expected to be associated with those individuals who were active at a level sufficient enough for health benefits, as those influences were mentioned by older females as important for being active.

STUDY ONE

Although specific channels and types of social influence have been identified in adolescent groups as impacting physical activity behaviour (Spink, 2003), to the author's knowledge, these specific channels and types of social influence have not been explored with older females. Rather than assuming that the same channels and types of social influence would emerge with older females as with adolescents, the purpose of the first study was to use focus groups to explore whether the same social influence channels (i.e., family, friends, significant others) and types (i.e., obedience, compliance, conformity, modelling) that emerged with adolescents would be identified by older females. As well, a secondary purpose of Study One was to explore whether there were any other influences that consistently emerged as factors impacting the physical activity behaviours of older females.

Methods

2.1 Participants and Participant Selection

Fifteen elderly participants (over 50 years) with experiences of being active were purposefully sampled from two exercise clubs and one exercise facility using snowball sampling. Although the criteria for participating was over 50 years of age, the majority of participants appeared to be between 70 and 80 years of age. Further, from the researcher's perspective, it was speculated that the age range for these participants was between 60 and 90 years of age. Through the discussions, the researcher gained the impression that while some of the participants were married most were widowed, but interacted with their children or other family members. Two focus groups (one group of 10 participants and one of five participants) were formed. These active participants were selected because they were thought to have experience both with physical activity as well as social influences relating to physical activities. The size of these focus groups fell within the usual number for focus groups, which vary from 4 to 12 participants (Krueger & Casey, 2000). Further, the different sizes in the two groups created a balance of the breadth of experiences from the larger group and the more in depth discussion from the smaller group with five participants (Krueger & Casey, 2000).

Purposeful sampling was used to recruit participants who would be information rich in the experiences of social influence and physical activity (Patton, 2002).

Recruitment took place by approaching potential participants at seniors' exercise

programs as well as posting recruitment information at various exercise facilities. After providing a general overview to participants in various exercise clubs, contact was made with interested individuals. Snowball sampling (Patton, 2002) was used to encourage participants who had already expressed an interest to find additional participants who would be information rich.

As noted above, two separate focus groups were conducted. The first and larger focus group was hosted by one of the participants and took place within her home and provided a setting which was familiar and comfortable for the participants. Within this focus group, one male was included. As recruitment for this focus group was mostly done using snowball sampling, the researcher was not aware of his participation prior to the focus group and rather than turning him away, allowed him to participate in the discussion. In addition, the fellow participants appeared comfortable with his presence as he also participated in many of their other groups (i.e., singing group). A post hoc analysis revealed that similar themes emerged from both focus groups such that his participation was not perceived to have a strong impact upon the discussion. The second focus group was held in a meeting room near an exercise facility, which was selected because of its ease of access for the participants.

2.2 Procedures

In terms of protocol for both groups, the researcher first explained the purpose of the focus group discussion, reviewed the consent forms (see Appendix A) and made sure all participants were comfortable with the discussion being tape recorded. After the completion of the informed consents, the tape recorder was started and the researcher commenced the session with an introduction as to what was to be discussed,

which was then followed by questions from a semi-structured interview guide (see Appendix B).

The interview guide was based upon the literature that focuses on the four main types of social influence (i.e., obedience, compliance, conformity, and modelling) and, from this, questions were developed to stimulate discussion surrounding these topics. Initially, these questions were broad, asking about who and then how the participants were influenced. Beyond this general discussion, more specific questions were included within the interview guide to provide a more focused discussion pertaining to each of the different types of influence and whether these types were important among older adults. Further questions were included to try to elaborate on the nature of the influence, amount of influence necessary, and the participants' reaction to the social influence.

As a starting point for the focus group discussions, a circle mapping technique was used. This method has been used previously to create a social network map encompassing all the individuals with whom the individual has a relationship (Biegel, Shore, & Gordon, 1984; Tracy & Whittaker, 1990) Within the physical activity context, Chogahara (1999) has used this technique (i.e., circle mapping) to stimulate interviews investigating social influences. Using this technique, participants were asked to place individuals who had influenced them to be active on a series of concentric circles (see Appendix C). These concentric circles were divided into various channels: family, friends, clubs, formal service providers (i.e., doctor), co-workers, and other. These channels included the common social influences identified by Spink (2003), those mentioned by adults (Carron et al., 1996; Chogahara, 1999; Trost et al.,

2002) as well as other channels related to social networks (Beigel et al, 1984) and social support (Tracy & Whittaker, 1990) in an effort to encompass all possible sources of influence for older adults. Participants were told to place important influences closest to the centre point and weaker influences in the outermost rings.

Following the completion of these circle maps, the researcher then posed questions from a semi-structured interview guide (see Appendix B). Questions focused on having participants describe their own personal experiences of social influence with the individuals that they included on their circle map. Further questions probed to determine the type of social influence, the channel of the influence, the perceptions of its effectiveness as well as their reactions to the influences. Additional questions that were asked included the identification of any possible moderators such as health and living arrangements that might affect the relationship between social influences and physical activity.

Following the conclusion of the focus groups, the researcher wrote in a journal her impressions concerning each of the discussions. This included the types of influences that emerged and a summary of any discussions that the researcher perceived as interesting were recorded as well. The audio tapes were transcribed verbatim by the researcher for purposes of data analysis.

As the moderator, which in this case was the researcher, is the instrument for qualitative research, it is important to be aware of the characteristics and skills of the researcher (Krueger & Casey, 2000). As a young female, I attempted to share some of my own experiences both with physical activity and with social influences to allow the participants to form a relationship with me. Additionally, throughout the discussion, I

made an effort to use active listening skills and encouraged participants to talk and expand on previous comments through the use of probes and non-verbal encouragement. As well, efforts were made to discourage some talkers from dominating the conversation as well as encourage some of the more reserved participants to share information. Overall, an effort was made to make the participants feel comfortable and that they had something valuable to offer.

2.3 Data Analysis

An initial analysis of the transcripts was performed with the intention of identifying salient channels and types of social influence. As the main purpose of the analysis was to simply identify the types and channels of social influence that the participants thought were important, an elaborate analysis was not required (Krueger & Casey, 2000). The transcripts were read by the researcher to identify channels and types of social influence, considering the words used, the context of the words, and the specificity of the responses (Krueger, 1988). Quotes representing each type and channel of influence were then coded and collected in a separate word document.

Following this preliminary analysis, the researcher explored the transcripts for common themes and patterns (Krueger, 1988) in order to provide a greater understanding of influences that related to physical activity. Although literature on social influence guided the development of the research question as well as the focus group interview guide, the strategy for this part of the analysis was inductive. After an initial reading of the transcripts, sections that were of interest pertaining to influences of physical activity were marked (Seidman, 1998). For this reading, the term influences was broadened beyond just social influence to include anything the participants

mentioned that may have impacted their physical activity behaviour. Although the interview guide focused on social influence, discussions within the focus groups were more diverse resulting in other influences emerging. Since participants were not able to entirely separate the social influences from other influences, this second more inductive analysis was performed in order to capture the essence of the discussion. These influences were then coded and subsequently grouped into themes (Seidman, 1998). Quotes that represent each theme were collected and were used to provide a description for each theme (Krueger & Casey, 2000).

Even though the priority of this study was quantitative, steps were taken to ensure the quality of the data collected in this first study (Lincoln & Guba, 1985). Member checks were performed giving the participants the opportunity to review the transcripts, add any information, change or alter any incorrect information (Lincoln & Guba, 1985). This was done to ensure that the transcripts accurately reflected what the participants said during the discussion as well as provided the opportunity for the participants to add any additional information that they thought important, but was not included within the transcripts. Participants received a copy of the transcript and were encouraged to review it and make comments. In addition, the two focus groups allowed for triangulation of sources by having two copies of the same type of source (Lincoln & Guba, 1985). These two focus groups were analysed separately initially and then the results were combined. Although the results of this study cannot be generalized to other populations, the inclusion of quotes to provide a thick description of the themes that emerged will allow readers to evaluate the extent that the findings could transfer to other settings (Lincoln & Guba, 1985). Throughout the process of recruiting

participants, conducting the focus groups and analyzing the results, a reflexive journal was kept by the researcher, which provided the opportunity to reflect on the process, methods, and analysis for each focus group. The processes of member checking, triangulation, and reflexive journaling were used to help ensure the trustworthiness of the data (Lincoln & Guba, 1985).

Results

To facilitate the presentation from the focus groups, the results will be presented in two sections. The first will focus on the channels that emerged from the circle maps and the second section will explore the channels and types of influence that emerged from the focus group discussions.

3.1 Circle Maps

To help consolidate the data about channels from the circle mapping, the data from the maps of each participant were collapsed into one map for each focus group. Each map represented all the channels of influence that were thought to be important. A visual inspection suggested that the maps from each group were not different. As such, the maps for the two focus groups were collapsed into one map (see Figure 3.1).

As a guide to interpreting the map, the influences that are within the inner circle represent the most important influences with the weaker influences appearing further away from the center. As can be seen in Figure 3.1, the most important influences (i.e., inner circle of the map) appeared to fall within the channels of service providers, family, and friends. By way of explanation, the numbers within the brackets represent the number of times an influence was identified. Although influences within the clubs and organizations channel were mentioned, the influences were not as frequently cited as the influences in the other channels.

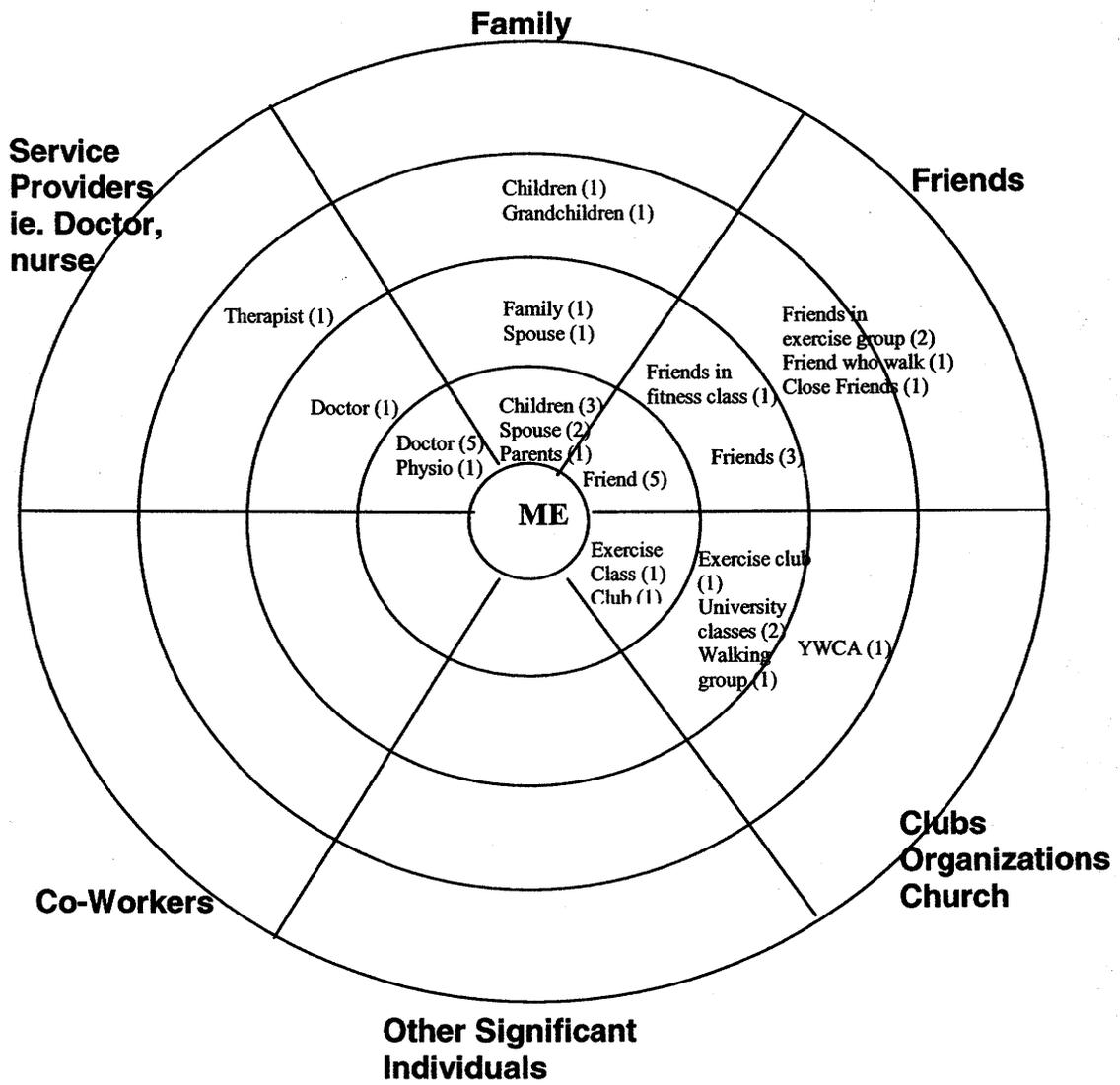


Figure 3.1: Channels Important for Physical Activity

In the service providers' channel, healthcare workers including doctors and physiotherapists were included as important influences. In the family channel, social influences came from children, spouses, parents, and the overall family. Although there was some variation in the importance of influences (e.g., the influence of friends ranged from the innermost circle to the outermost circle), all of the channels mentioned above had influences identified within the innermost circle.

3.2 Focus Group Discussions

Although the focus of this research was on social influences, to obtain a more comprehensive perspective on the reasons for being physically activity participants were encouraged to identify all sources. In addition to social influences, an analysis of the transcripts revealed two other broad categories of influences for physical activity - environmental and personal influences (see Figure 3.2 for a summary of the categories that emerged).

Within social influences, a number of influences were identified, but the majority of influences could be coded into the four main types, which were categorized as obedience, compliance, conformity, and modelling. Two other minor influences that emerged included: environmental influences (e.g., the accessible nature of facilities and safety) and personal characteristics (e.g., self-motivation and health). Each of these themes will be discussed, in turn, and supported by quotes that illustrate each theme.

3.2.1 Social Influences

3.2.1.1 Social – Compliance

Compliance, which implies behaviour changes in response to direct requests from others, was seen as it relates to physical activity. One of the best ways to promote

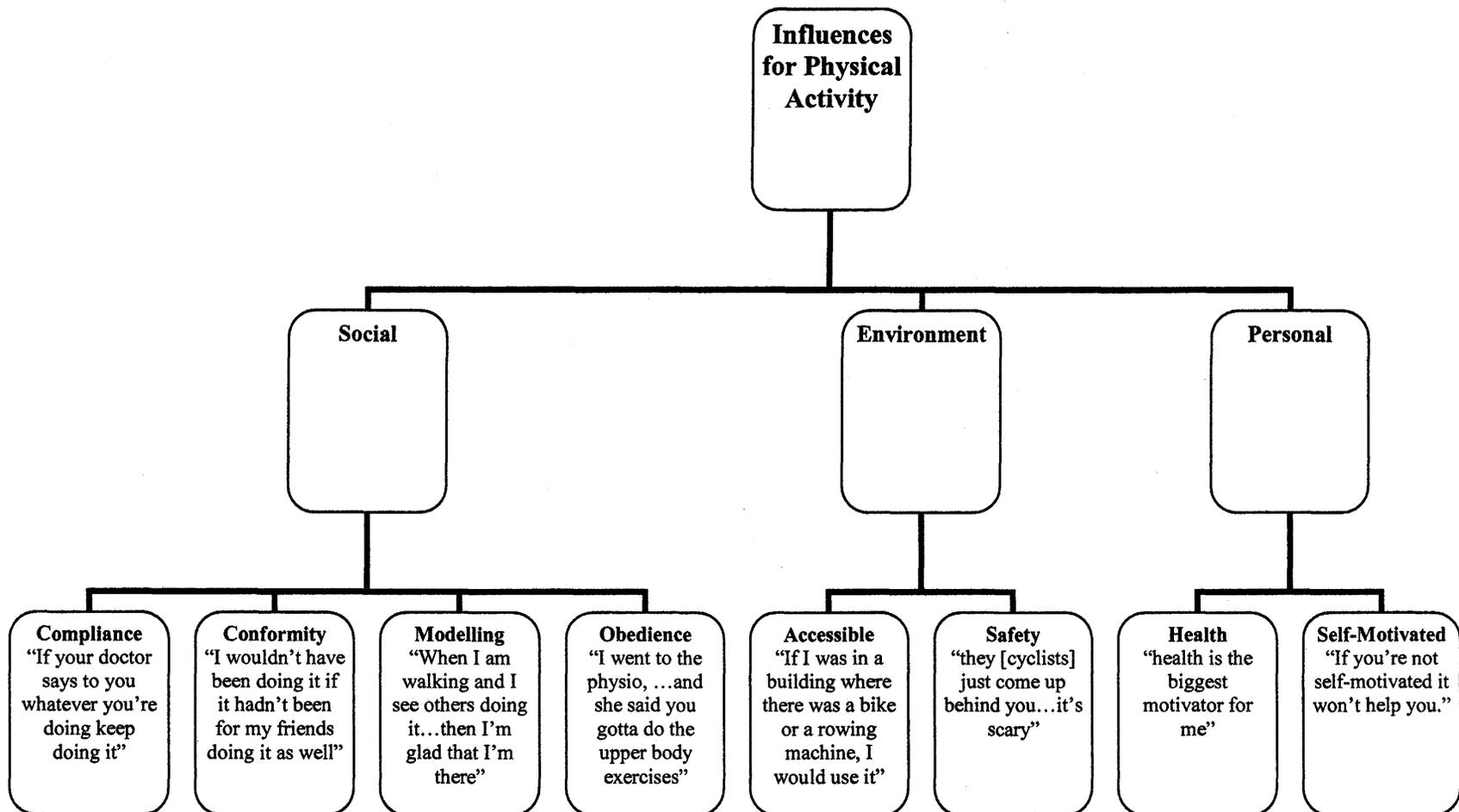


Figure 3.2: Influences for Physical Activity

compliance is to use compliments and praise, which can readily be seen in the following quotes:

If your doctor says to you whatever you're doing keep doing it.

[doctor says] you must be doing something right.

A compliment about how you look or something...if you're losing weight, ...I'll keep this up, it's working.

Within compliance, the channels that emerged were family (e.g., daughter, son), friends, and healthcare workers.

3.2.1.2 Social – Conformity

Conformity (e.g., adherence to accepted standards or norms) was a type of social influence that was frequently discussed as a reason for doing physical activity by these older females. This type of influence came mostly from friends and wanting to do what friends were doing.

Where I live now I have a close friend and we walk together now. . . and that is certainly is the influence. If ah, say, she doesn't feel like going tonight, she'd probably go because I was going or vice a versa.

I just wanted to keep up with my friends.

I wouldn't have been doing it if it hadn't been for my friends doing it as well.

Conformity to the norms or doing what friends were doing seemed to be an important influence that was discussed by both focus groups. However, no other channels emerged with conformity.

3.2.1.3 Social – Modelling

Modelling by others was mentioned as a reminder to remain active, with the primary channels being either friends or family. It was often described as seeing others

being active, and in most cases, the person being modelled was unaware of the modelling.

I look over my balcony and see some of you people striking out for a walk and think I should be doing that.

When I am walking and I see others doing it I say 'good' and then I'm glad that I'm there.

Several women in there that are well, alone like I am, and they're 87, 89 and they are super active, they are like mentors to me. I think if they can do it, I can.

Another form of modelling that was mentioned involved seeing television ads or programs for exercise that served as a reminder to keep active:

But it is quite a temptation when those exercise people come on, they get up and do something...it is hard to sit down for that.

Various models served as important reminders for the participants to keep up their physical activities.

3.2.1.4 Social – Obedience

Although obedience was mentioned by some of the participants, it wasn't mentioned as frequently as an influence for physical activity as the previous three types. When it was mentioned, it was typically associated with a service provider (e.g., doctors and physiotherapists).

So I went to the physio, she said you have got to keep that lymphatic fluid moving, and she said you gotta do the upper body exercise and so on and keep that going, and so far, so good.

However, even though obedience to a health care provider's orders was mentioned as a source of influence for maintaining physical activity, other channels ordering physical activity appeared to result in an opposite result on the part of the individual:

I think it depends on who's doing the ordering...well, I would respond to my doctor, which I did, but if [a friend] came along and said to me 'get going', I don't know if I would or not.

Don't tell me what to do ... that independence spirit.

3.2.2 Other Influences

3.2.2.1 Environment – Safety

Beyond the social influences, feeling comfortable within the environment also was mentioned as important for remaining physically active. For instance, not feeling safe in the neighbourhood, leery about going out after dark or fear of getting run over by cyclists on the sidewalks, were all negative environmental influences.

They [cyclists] just come up behind you...it's scary.

Well after you've been hit on the arm with bicycle handle bars and you have had people on rollerblades hitting you as you go by, I don't use it.

It's not safe to go walking at night by yourself.

3.2.2.2 Environment – Accessible

The accessibility of the environment was mentioned as an influence. Paths or malls to walk that were clean, maintained and not crowded were important as were the location of exercise facilities (e.g., walking distance or within the same building).

The Y being stayed here has influenced me to stay active because all I have to do is walk across the street.

And if you are close to the river it's along the trail...I think the river makes a big difference in walking.

If I was in a building where there was a bike or a rowing machine, I would use it.

3.2.2.3 Personal – Self-motivated

Self-motivation was mentioned as important for being physically active.

Participants mentioned that you have to want to continue being active and need to believe in exercising or else you are not going to maintain your physical activity level.

If you don't want to continue, you won't.

You have to make up your own mind that you want to exercise. You want to go to something.

If you're not self-motivated, it won't help you. I think when [you] get to our age you're going to do what you're going to do.

They have to make up their own mind about how active they're going to be.

3.2.2.4 Personal – Health

Of all the other influences mentioned by participants, health was the influence that was mentioned most by the participants. Health was discussed as often by the participants as the social influences. Health was mentioned as a motivator for physical activities. Using physical activity as a method of preventing chronic diseases such as heart disease and hypertension, or maintaining a good quality of life through maintaining the functional ability and mobility, was a strong influence for most participants.

Health is one of the big issues, trying to maintain health and keep the arthritis from aching so bad and keep walking, you want to keep yourself mobile as long as possible.

I've got to keep that body in some kind of shape and I don't have any kids to look after me at the other end.

We have a tremendous amount of heart disease so it's in the genes so there are a lot of us that are concentrating on being as healthy as we can and that kind of thing.

3.3 Summary of Influences

With regard to the specific research question, we see that all social influence types (e.g., obedience, compliance, conformity, and modelling) emerged and the main channels that emerged were family, friends and health care workers such as doctors and physiotherapists. Not all channels were important within each type of influence. For instance, health care workers were the only channel mentioned relating to obedience (see Table 3.1 for a summary of these channels and types). Although the focus was on social influences, participants also mentioned other influences such as environmental and personal factors as being important.

Table 3.1: Summary of Channels and Types Relating to Physical Activities

	Friends	Family	Healthcare workers
Obedience			X
Compliance	X	X	X
Conformity	X		
Modelling	X	X	

Note: X – this combination of channel and type was discussed by participants in the focus groups

STUDY TWO

The purpose for Study Two was to use the information gleaned from Study One about channels and types to explore the relationship among these identified social influences and the physical activity behaviour of elderly females. The results from the focus groups in Study One revealed three main channels of social influence: family, friends, and healthcare workers. These three channels were used in the development of the questionnaire for Study Two. In addition, the focus group discussions from Study One found that each of the four types identified previously with another population (i.e., obedience, compliance, conformity, and modelling) also were mentioned as impacting the physical activity behaviours of these older females.

While all the channels and types emerged from the focus group discussions, it is worth noting that not all the possible combinations of channel/type interaction emerged. For instance, the influence from friends (channel) was mentioned in combination with modelling, conformity, and compliance (types) but not obedience, which only was mentioned with regard to healthcare workers (channel). Notwithstanding these omissions, a decision was made to include all possible channel/type interactions when developing the questionnaire. The rationale for including all possible combinations of channels and types of social influence was predicated upon the finding that all of the channels and types were mentioned at least once in Study One and the ability to generalize is not associated with qualitative research (Lincoln & Guba, 1985). In addition to using the channels and types of social influence identified in Study One, an

attempt was made to combine the terminology that the participants from Study One used in conjunction with the literature in the formulation of questions.

Also emerging from Study One was the idea that health and physical activity participation were linked. Although other influences (e.g., environment and personal) emerged from the focus groups, health was one factor that nearly all the participants mentioned as being important to their physical activity behaviours. This may not be too surprising given that perceived health has been shown to both have a direct (Duffy, Rossow, & Hernandez, 1996) and an indirect effect through perceived barriers and self-efficacy (Conn, 1998; Conn, Burks, Pomeroy, Ulbrich, & Cochran, 2003) on physical activity and exercise behaviours. Given the prevalence of disease and disability among older adults (Fried et al., 1999), as well as the emergence of health as a theme from Study One, perceived health was deemed to be an important variable that would influence physical activity levels and, as such, was included in the analysis as a possible predictor. Given that most participants in the focus groups equated being active with remaining healthy, it was predicted that higher perceived health would be associated with being active enough for health benefits.

The purpose of this study was to relate social influence channels and types to activity level using a cross-sectional survey. Based on the social influences that were identified in Study One as being associated with being active, it was expected that the following social influences would be associated with the active group: obedience from the healthcare workers; compliance from family, friends, and healthcare workers; conformity with friends; and modelling from family and friends.

Methods

4.1 Participants

The participants for this study were 145 older females (with an inclusion criterion of older than 50 years) who were recruited from various community groups. The mean age of the participants was 74.7 ($SD = 9.16$) years, with ages ranging from 51 to 95 years. The community groups from which the participants were recruited included choirs ($N = 8$), church groups ($N = 25$), fitness groups ($N = 37$), service organizations ($N = 16$), and various senior's housing complexes ($N = 54$). A small number of participants ($N = 5$) did not have a group association as they either responded to advertisements for the focus groups but were too late to participate in the focus groups or returned the questions via the mail so the researcher was unable to match the questionnaire with the appropriate group.

4.2 Measures

4.2.1 Physical Activity

The Older Adult Exercise Status Inventory (OA-ESI; O'Brien-Cousins, 1996) was used to assess the leisure time energy expenditure of the participants. A copy of the OA-ESI appears in Appendix D. Even though the OA-ESI contains sections pertaining to both work related and leisure activities, only the activities done for leisure were included in this study. This questionnaire is a modified seven-day physical activity recall (Sallis et al., 1985) that uses age-relevant activities (e.g., walking, aerobic fitness classes, snooker). Participants are asked to write the time in minutes that they

participated in each type of listed activity on each day of the week for the past seven days. The inclusion of the activities and the days of the week are thought to be memory enhancing (O'Brien-Cousins, 1996). In terms of reliability, two week test-retest reliability using both males and females age 58-90 years has been found to be acceptable ($r = 0.86$ - Chogahara, 1999; $r = 0.77$ - O'Brien-Cousins, 1996). In addition, the predictive validity of the OA-ESI has been assessed and a positive relationship has been found with self-efficacy ($r = 0.32$) and positive health ratings ($r = 0.22$), and negative relationship with related perceived risks ($r = -0.19$) and age ($r = -0.26$) (O'Brien-Cousins, 1996).

4.2.2 Social Influence

As no research within the physical activity setting has looked at these four types of social influence (e.g., obedience, compliance, conformity, and modelling) other than Spink (2003), no questionnaire exists to assess these influences. As such, a questionnaire was created for this study. The procedure to create this questionnaire is outlined next.

The questionnaire used to assess social influence was developed using some of the wording of the channels and types of influence from Study One, which was a qualitative examination of social influences on the physical activity behaviours of older females. The resulting scale was a 36-item questionnaire that assessed three channels (i.e., family, friends, and healthcare workers) crossed with four types (i.e., obedience, compliance, conformity, and modelling), which resulted in 12 different channel X type forms of social influence. For each of the 12 channel X type forms of social influence, three items were created to capture the interaction and each item was answered using a

four-point Likert scale with anchors: not at all (1), a little bit (2), somewhat (3), and very much (4). For instance, three items assessed how family (channel) used conformity (type) to influence physical activity. This pattern was repeated separately for the channel of family with the other types of social influence (i.e., obedience, compliance, and modelling). This procedure was then repeated with the other two channels (i.e., friends and healthcare workers)

For obedience, a sample question was “How much does having the following individuals *directing* you to be active influence your activity level?” A separate response scale was included for family, friends, and healthcare workers. For compliance, an example of a sample item was “How much does having the following individuals *suggest* that you do physical activities influence your activity level?” Once again, each of the channels (family, friends, and healthcare workers) had a separate response scale. A sample item for conformity was the question “How much is your activity level influenced because you *want to fit in with* the following individuals?” Response scales for family, friends, and healthcare workers were included following the question. Finally, a sample item for modelling was captured in the question “How much is your activity level influenced by simply *observing* the following individuals be active?” As was the case in the previous three examples, response scales for the three channels (family, friends, and healthcare workers) were included after the question. A copy of the social influence questionnaire is included in Appendix E.

The questions were reordered to mix the order of family, friends, and healthcare workers as well as types of social influence throughout the questionnaire. The questionnaire was piloted with selected older females ($N = 7$; ranging in age from 59 to

83) to ensure the clarity of the questions and evaluate the completion time of the questionnaire.

4.2.3 Perceived Health

Perceived health was assessed by asking: *In general, how would you describe your current state of health?* Participants answered using a Likert-type scale (1 - excellent to 5 - poor). For ease of interpretation, this scale was reversed scored so a higher score related to perceptions of better health and a lower score related to perceptions of poorer health.

4.2.4 Demographics

Two questions were included with the questionnaire to assess demographic information (see Appendix F for these questions). Age was assessed through an open-ended question. History of physical activity also was assessed using five categories: not currently active, active for less than 6 months, active for 6-12 months, active for more than 1 year to 5 years, and active for more than five years.

4.3 Procedures

The various groups of older females were visited to administer the questionnaire. First, the various organizations, clubs, and residences were approached to see if it was feasible to administer the questionnaire to their members. Following approval from the organization, arrangements were made to visit during a meeting to administer the questionnaire to potential participants.

The researcher gave an overview of the study, reviewed the consent forms, and then handed out the questionnaires. With the explanation of the consent form (see Appendix G), participants were assured of the confidentiality and anonymity of their

responses. After receiving consent, participants were asked to complete the questionnaires in one of two ways depending on the logistics of the meeting. If there was time to complete the questionnaires during the actual meeting, the participants completed the questionnaire at that time, which took between 10-30 minutes. If the meeting was not conducive to completing the questionnaire during the session, the participants took the questionnaire home and arrangements were made to retrieve the questionnaire at the next meeting time.

4.4 Data Analysis

The data analysis was completed in two parts. First, since the social influence questionnaire was developed for this study, the underlying structure of these questions was assessed using factor analysis¹. Principal component analysis with oblique rotation (since factors were expected to be related) was used to explore the underlying factors within the social influence questions and these underlying factors were then used in the main analysis. In addition, the reliability of these factors was assessed by evaluating the internal consistencies of the items using Cronbach's (1951) alpha.

Second, analyses were performed to answer the research question relating social influence and physical activity. In order to do this, physical activity was converted into a dichotomous variable in which active participants were compared with insufficiently active participants. A leisure time energy expenditure greater than or equal to 3 KKD

¹ Although creating factors using the conceptual model outlined (i.e., conformity, compliance, obedience, and modelling crossed with channels) was a possibility, post hoc analysis revealed that some the subscales were highly correlated with each other (see Table H.1. in Appendix H). Owing to the fact that some of these correlations were very high (i.e., larger than 0.8), it was thought that collinearity might be an issue so further examination of the items using exploratory factor analysis was deemed appropriate.

was selected as the criteria for the active group since it is the value associated with health benefits for adults (Craig et al., 1998). A cut point of less than 2 KKD was selected for those insufficiently active to receive health benefits in order to balance the number of participants within each group with the maximal variation in activity level from the active group.

Although the conversion of physical activity into a dichotomous variable results in the loss of information of those participants who fall between the two criteria, it is assumed that with the exploratory nature of this study an extreme groups design would allow a clearer picture by maximizing the variation in the dependent variable. Further, there are numerous examples in the physical activity literature where a dichotomous variable has been created including sedentary versus not sedentary (Eyler et al., 1999), insufficiently active versus sufficiently active (Booth et al., 1997), adherers versus non adherers (Duncan, Duncan et al., 1993), frequent exercisers versus infrequent (Kaplan et al., 2001), attendance versus non-attendance (Spink & Carron, 1992), and regular attenders versus drop outs (Spink & Carron, 1994).

Discriminant function analysis was then performed to explore which influences were associated with classifying individuals into an active group compared to an insufficiently active group. The purpose of discriminant function analysis is to predict group membership by using a set of predictor variables (Tabachnick & Fidell, 2001).

For the current analysis, the social influence factors revealed through the factor analysis, as well as the variable of perceived health, were the independent variables predicting membership in the active versus insufficiently active groups. A linear combination of these predictor variables was created to maximize the classification

between the groups of the dependent variable. Discriminant function analysis is a robust statistical technique. Especially when there are no outliers, discriminant function analysis is robust to violations of multivariate normality and homogeneity of variance-covariance matrices (Tabachnick & Fidell, 2001). Further, to handle the problems associated with multicollinearity and singularity, SPSS tests tolerance levels and excludes predictors with insufficient tolerance levels. A significance level of $p < 0.05$ was used for the analyses.

Results

The results are presented in two sections. In the first section, an assessment of the social influences using factor analysis will be outlined. This will be followed by the main analysis, which will report on the analysis examining the relationship between social influences and physical activity levels.

Before starting the main analysis, the physical activity scores were screened for outliers, which are cases with an extreme score (Tabachnick & Fidell, 2001). Not only may these cases have a strong impact on subsequent analysis, these cases may not represent the intended population and may differ on the other variables. In order to evaluate the presence of outliers, histograms, boxplots and z-scores were used. Histograms and box plots were created and visually inspected by looking for cases that were extreme and set apart from the rest of the sample. Z-scores were computed and then compared to a value of 3.29, which was selected because it identifies cases that fall beyond where 99.9 % of the population are thought to be located, and so are the extreme 0.1% of the population. Four cases were identified as outliers (i.e., with a z-score greater than 3.29 and/or seen as separate from the rest of the distribution when looking at the histogram and boxplot). The rest of the analysis was performed with these four outliers removed.

5.1 Factor Analysis of Social Influence

Factor analysis was performed on the questions of social influence to evaluate whether the types and channels assessed emerged as separate components in the

questionnaire. Since this questionnaire was specifically developed for this study, it was deemed important to evaluate whether the channels and types emerged as separate and distinct factors. A principal component analysis with oblique rotation was performed on all the social influence questions. A value of 0.32 was used as a guideline to determine if a variable loaded on a factor (Tabachnick & Fidell, 2001). Cross loadings were identified as variables that loaded on more than one factor with values of at least 0.32. Variables that had loadings of 0.32 or greater on more than one factor were considered to have cross loaded and were not included in the factors.

Several possible solutions were evaluated through a variety of methods, including examining the size of eigenvalues, scree plots, and cross loadings. A six-factor model was selected as the best solution, and accounted for 77.8% of the total variance (see Table 5.1 for a summary of factor loading). Each of the six factors had an eigenvalue greater than 1.0 (Factor 1 = 18.23, Factor 2 = 3.48, Factor 3 = 2.29, Factor 4 = 1.62, Factor 5 = 1.36, Factor 6 = 1.02). An interpretation of this six-factor solution suggests the emergence of components grouped by both channels and types.

The seven items that loaded on Factor 1 appeared to reflect the influence of the family channel, with compliance (2 items), modelling (2 items), conformity (2 items), and obedience (1 item) all emerging as types of influences. Given focus on the family channel, this factor was termed family.

Seven items were found to load on Factor 2. An examination of the item loadings revealed that the factor appeared to capture social influences from the healthcare workers' channel, with an emphasis on both obedience (3 items) and compliance (3 items) types. One other item loaded on this factor - "how much is your

Table 5.1: Factor Analysis Results for Social Influence Questionnaire

					Component					
Item #	Channel	Type	Key Word	1	2	3	4	5	6	
1	1	Family	Compliance	suggest	0.833					
	2	Family	Conformity	fit in	0.729					
	4	Family	Modelling	observe	0.722					
	8	Family	Modelling	see	0.709					
	6	Family	Conformity	expect	0.643					
	5	Family	Compliance	ask	0.616					
	3	Family	Obedience	direct	0.591					
2	10	Healthcare Workers	Compliance	request		0.855				
	1	Healthcare Workers	Compliance	suggest		0.853				
	7	Healthcare Workers	Obedience	tell		0.843				
	5	Healthcare Workers	Compliance	ask		0.800				
	11	Healthcare Workers	Obedience	order		0.684				

	3	Healthcare Workers	Obedience	direct					0.678		
	6	Healthcare Workers	Conformity*	expect					0.658		
	3	No items loaded									
	4	11	Friends	Obedience	order				-0.713		
		7	Friends	Obedience	tell				-0.679		
		10	Friends	Compliance	request				-0.581		
		6	Friends	Conformity*	expect				-0.506		
	5	8	Healthcare Workers	Modelling	see				0.699		
		4	Healthcare Workers	Modelling	observe				0.667		
		9	Healthcare Workers	Conformity**	doing it too				0.565		
	6	12	Friends	Modelling	exposure				-0.827		
		9	Friends	Conformity**	doing it too				-0.808		
		8	Friends	Modelling	see				-0.723		
	Eigenvalues					18.232	3.480	2.299	1.620	1.357	1.024
	% of Variance					50.644	9.666	6.386	4.501	3.769	2.844

Cumulative %	50.644	60.309	66.695	71.196	74.964	77.808
Rotation SSL	11.025	10.804	3.891	10.392	7.286	9.264

**Initially designed to assess conformity but was reclassified to relate to obedience/compliance based upon its loading*

***Initially designed to assess conformity but was reclassified to relate to modeling based upon its loading*

Note: Only values that loaded on each factor were included ($N = 145$)

Complete loadings are included in Table I.1 in Appendix I.

activity level influenced because it is what healthcare workers *expect* you to do”.

Although it was included originally as an item reflecting conformity, in hindsight it was likely more consistent with obedience. As such, it was reclassified as an item reflecting obedience. This factor was labelled healthcare workers – obedience/compliance.

In terms of Factor 3, three items pertaining to the influence from friends emerged. However, it was noted that one of these items showed clear cross loading with the other factors. Less clear was the loading of the two remaining items that appeared to have relatively high loadings (round to 0.3) upon two additional factors, so these items were removed from the subsequent analysis as well. With no items loading cleanly on Factor 3, it was eliminated from further analysis.

The four items that loaded on Factor 4 reflected the social influence types of obedience and compliance, with three of the items associated with the channel of friends and one item associated with the channel of family. To help in the interpretation of the factor, the family obedience item was dropped, resulting in a cleaner factor that was labelled friend – obedience/compliance. Similar to the healthcare workers – obedience/compliance factor identified above (i.e., Factor 2), the item pertaining to “*expect* of you” was reclassified as an obedience item.

Three items loaded on Factor 5. As noted in Table 5.1, these items appeared to capture the channel of healthcare workers whose influence was through modelling. Included with two modelling items was a single item originally designed to assess conformity: “doing it as well”. Although this item was created to capture conformity, in hindsight it could be reasoned that if healthcare workers were doing physical activity as well, then the healthcare worker was modelling activity. As such, the item was

reclassified as one reflecting modelling. This factor was termed healthcare workers – modelling.

Finally, three items loaded on Factor 6. An inspection of the items that loaded indicated that this factor was made up of the influence from friends, with an emphasis on modelling. Similar to Factor 5, the same item originally designed to assess conformity loaded with this factor, but was reclassified as an item reflecting modelling. This final factor was labelled friends – modelling.

As mentioned previously, an oblique rotation was performed since it was thought that the factors would be related to each other. As expected, the factors were correlated (see Table 5.2 for these correlations) with the highest correlations between Factor 4 (friends – obedience/compliance) and Factor 6 (friends – modelling; $r = 0.46$). As well, Factor 2 (healthcare workers – obedience/compliance) was related to Factor 5 (healthcare workers – modelling; $r = 0.45$).

To assess the internal consistency of each of these five factors, Cronbach's (1951) alpha coefficients were computed. The alpha coefficients for Factor 1: family (0.93), Factor 2: healthcare workers – obedience/compliance (0.94), Factor 4: friends – obedience/compliance (0.89), Factor 5: healthcare workers – modelling (0.87), and Factor 6: friends – modelling (0.90) revealed that all factors had acceptable internal consistency (cf. Nunnally & Bernstein, 1994). Table 5.3 shows the internal consistency values and the means for each of the factors. Since some questions were left blank creating missing values, individuals' scores for each factor were created by using the mean of their responses on the items included within each factor providing they had answered at least two of the items on each factor.

Table 5.2: Correlations Between the Components from the Factor Analysis

Factor	1	2	3	4	5	6
1 Family	1.00					
2 Healthcare workers – obedience/compliance	.345	1.00				
3	.175	.175	1.00			
4 Friends – obedience/compliance	-.399	-.398	-.142	1.00		
5 Healthcare workers – modelling	.277	.445	-.086	-.302	1.00	
6 Friends – modelling	-.383	-.266	-.231	.455	-.255	1.00

Note: N = 145

Table 5.3: Descriptive Statistics and Internal Consistencies for Social Influence Factors

Factor		<i>M</i>	<i>SD</i>	<i>n</i> items	Range	Cronbach's Alpha
Factor 1	Family	2.00	0.84	7	1 – 4	0.9295
Factor 2	Healthcare workers – obedience/compliance	1.97	0.95	7	1 – 4	0.9441
Factor 4	Friends – obedience/compliance	1.61	0.78	4	1 – 4	0.8860
Factor 5	Healthcare workers – modelling	1.69	0.87	3	1 – 4	0.8689
Factor 6	Friends – modelling	2.05	0.95	3	1 – 4	0.8972

Note: N = 90

5.2 Main Analyses

As discussed previously in the methods section, an extreme-groups design was used to dichotomize activity into those active enough to receive health benefits (≥ 3 KKD; $N = 58$) and those who were not sufficiently active (≤ 2 KKD; $N = 32$). The mean activity level for the active group was 6.09 KKD ($SD = 2.65$) and for the insufficiently active group it was 1.08 KKD ($SD = 0.62$). These two means were significantly different ($t = -13.6, p < 0.001$).

This dichotomous activity variable was then used as the outcome variable in a discriminant function analysis in which the social influence factors along with perceived health were examined as predictors. Prior to performing the analysis, cases were screened for multivariate outliers (cases that fall outside the cluster of values within multivariate space; Tabachnick & Fidell, 2001) using the Mahalanobis distance ($p < 0.001$). No multivariate outliers were found among cases included within the analysis and so all cases were retained for further analysis. Since health was mentioned within the focus groups relative to social influences, it was included as a variable in the discriminant function analysis along with the five social influences (friends – obedience/compliance, healthcare workers – obedience/compliance, family, healthcare workers – modelling, friends – modelling).

These predictors produced a significant discriminant function (Wilks' lambda = 0.806, $\chi^2(6) = 18.38, p = 0.005$). The linear combination of perceived health and the five social influences were found to discriminate between those who were active versus those who were insufficiently active enough for health benefits. The centroid for the active group was 0.361 and for the insufficiently active group it was -0.654. The

standardized canonical discriminant function coefficients revealed that perceived health (0.761), friends – obedience/compliance (Factor 4: 0.473), and healthcare workers – modelling (Factor 5: 0.369) loaded on the active group with positive coefficients. The standardized canonical discriminant coefficients for the active group suggested that perceived health and friends – obedience/compliance were the two factors that were most associated with the active group (i.e., the weighting for the largest absolute value, which was perceived health, was more than twice as large as the weighting for healthcare workers – modelling factor).

In terms of the other group, family influences (Factor 1: -1.079) and friends – modelling (Factor 6: -0.375) loaded with the insufficiently active group (see Table 5.4 for coefficients along with the means for each group). The standardized canonical discriminant coefficients for this group revealed that the weighting for family influences was approximately three times as large as for the factor of friends – modelling, suggesting that the influence of family was the factor most associated with the inactive group. Healthcare workers – obedience/compliance (Factor 2) had a low coefficient (0.183) suggesting that it did not load with either group.

The canonical correlation ($r = 0.44$) showed that the predictors were related to the physical activity groups. The squared canonical correlation indicated that 19.4% of the variance in groups was explained by these 6 predictors. When examining the ability of these six predictors to classify cases into the active group and insufficiently active groups, we see that 70.0% of the overall sample was correctly classified. Of those placed into the insufficiently active group, 68.8 % were correctly classified and of those placed within the active group, 70.7 % were correctly classified.

Table 5.4: Means and Standardized Discriminant Function Coefficients for Active and Insufficiently Active Groups

Variable	Means (<i>SD</i>) Insufficiently Active (≤ 2 KKD)	Mean (<i>SD</i>) Active Group (≥ 3 KKD)	Standardized discriminant function coefficient ^a
Perceived Health	3.09 (0.59)	3.53 (0.82)	0.761
Family	2.31 (0.88)	1.84 (0.77)	-1.079
Healthcare Workers – Obedience/compliance	2.04 (1.00)	1.93 (0.92)	0.183
Friends – Obedience/compliance	1.70 (0.78)	1.56 (0.78)	0.473
Healthcare Workers – Modelling	1.77 (0.84)	1.64 (0.89)	0.369
Friends – Modelling	2.21 (0.94)	1.97 (0.96)	-0.375

Note. Wilk's Lambda = 0.806 ($p = 0.005$). $R^2 = 0.194$ ($N = 90$)

^a Group centroid means: Insufficiently active = -0.654; Active = 0.361

In order to evaluate the unique contribution of the social influences over and above the influence of perceived health, a hierarchical regression was performed with the dichotomous activity variable as the outcome variable. Perceived health was entered into the regression in the first block, which was then followed by all five social influences in the second block. The results for this analysis are depicted in Table 5.5. Perceived health was found to be a significant predictor explaining 7.5% of the variance ($R^2 = 0.075, p = 0.009$) in level of physical activity. Following the second step, and the inclusion of all the social influence variables, an additional 11.9 % of variance ($R^2 = 0.194, p = 0.04$) in physical activity was seen, which represented a significant increase ($p = 0.005$) over and above that contributed by the perceived health predictor.

Table 5.5: Summary of Hierarchical Discriminant Function Analysis Predicting Physical Activity

	<i>R</i>	<i>R</i> ²	<i>R</i> ² change	Sig <i>F</i> change	Sig <i>F</i> model
Step 1 ^a	0.275	0.075	0.075	0.009	0.009
Step 2 ^b	0.441	0.194	0.119	0.040	0.005

^a Predictor: Perceived Health

^b Predictors: Perceived Health, Friends – Obedience/compliance, Healthcare workers – Obedience/compliance, Family, Healthcare workers – Modelling, Friends – Modelling

Note: *N* = 90

DISCUSSION

The purpose of this study was to explore the social influence channels and types that might be associated with physical activity levels in older females. A mixed methods design was used, which involved first exploring the experiences of older females through a qualitative approach using focus groups. This was followed by a quantitative phase that involved examining the social influences (i.e., channels and types) with the physical activity levels of older females. Given that channels, types, and the channel X type interaction have been associated with physical activity in a youth population (Spink, 2003), but not other populations, it was deemed important to establish support within an older population.

In terms of channels, support for the presence of separate channels of social influence in an older female population was provided through both the qualitative and quantitative studies. Emerging from the focus groups, three main channels of social influence were identified by participants. These influences included family, friends, and healthcare workers, which included both doctors and physiotherapists. These channels emerged from the circle maps as the domains that were mentioned most often in terms of influences on levels of physical activity. The results from the quantitative phase (i.e., principal component results) revealed that the same three main channels of social influence (i.e., family, friends, and healthcare workers) emerged within the factors.

These findings replicate two of the channels found within an adolescent population by Spink (2003), in that family and friends (identified as peers in the Spink,

2003 study) emerged as channels. In place of the healthcare workers mentioned by the older adults in this study, Spink (2003) found that significant others (i.e., coaches) comprised the third channel when examining an adolescent population. The emergence of a different third channel in adolescents as compared to older adults may not be too surprising and may simply reflect a difference in individuals who are salient in specific populations. In older adults, the inclusion of doctors among the channels discussed by the focus groups is not surprising considering that healthcare professionals have been mentioned by seniors as a good source from which to receive information (Afonso et al., 2001) as well as a preferred source for support for physical activity (Booth et al., 1997). In an adolescent population, on the other hand, where sports are prevalent, it would appear logical that coaches emerged as an important social influence (Spink, 2003).

In terms of the other two channels that emerged in this study, it is worth noting that both have been identified as consistent positive social influences in past research. For instance, social support from friends and peers has been shown to be related to exercise behaviour in older adults (Oka et al., 1995). Also, it has been consistently reported that social support from spouse and family in adult populations has been associated with increased exercise behaviour (Troost et al., 2002).

In addition to the emergence of different channels for social influence, the results from this study also revealed the importance of different types of social influence. The qualitative results revealed that participants disclosed experiences of the four different types of social influence (i.e., obedience, compliance, conformity, and modelling).

Within the factor analysis, the distinction between different types of social influence was not quite as clear. For instance, items related to modelling loaded as a

separate factor for healthcare workers and friends; thus, creating two factors for modelling (e.g., healthcare workers – modelling and friends – modelling). However, within these two factors reflecting modelling, it is worth noting that one item initially designed to reflect conformity loaded on both these factors. This specific item asked “how much is your activity level influenced because the following individuals are *doing it as well?*” Although this item was designed to tap into conformity, an examination of the wording suggests why it might easily align with modelling items. Specifically, for the participant to respond to the comment “doing it as well” would necessitate that they had observed others being active and thus, the item could be taken as an indicator of modelling just as easily as conformity. However, regardless of whether this single item could be construed as conformity or modelling, the fact remains that modelling appeared to be a type of influence identified by these older adults. The importance of modelling within the current population of older females is supported by other researchers who have found modelling to be related to physical activity in other populations including young and middle-aged adults (Booth et al., 2000; Deforche & De Bourdeaudhuij, 2000; Giles-Corti & Donovan, 2002) and adolescents (Prochaska et al., 2002).

Within both the channels of friends and healthcare workers, obedience emerged as an element loading on a factor for each channel. However, there were other items loading on both factors in the form of compliance items. For instance, a single compliance item (“How much does having your friends *request* that you do some physical activity influence your activity level?”) loaded together with the obedience items from friends forming a factor: friends – obedience/compliance. Similarly, items from both obedience and compliance associated with healthcare workers combined to

form a single factor. In addition, an item initially thought to relate to conformity loaded along with obedience and conformity items for both the friends and healthcare workers channels. In retrospect, this item: “How much is your activity level influenced because it is what healthcare workers *expect you to do?*” could just as easily be thought of as an obedience item in that it could be a strong influence that is verbalized by healthcare workers as opposed to being a norm for a group. However, regardless of whether this conformity item is included as an obedience item or not, the fact remains that obedience and compliance both loaded on the healthcare worker channel.

One possibility to explain this loading of different types on one factor could be due to the participants’ inability to discern an order versus a request from a healthcare worker. Within the healthcare setting, it has been found that the inclusion of a written prescription (obedience) along with advice (compliance) influenced physical activity (Pfeiffer et al., 2001; Swinburn et al., 1998), providing support for the influence of both obedience and compliance working in combination to impact physical activity.

Conformity, as a social influence type, did not load as a separate factor. Rather, the items either cross loaded or loaded on other factors. This might suggest that either the wording was not clear enough to make conformity a distinct factor or this sample of older females may not perceive conformity as separate and distinct from other types of influences. Within the literature, conformity as captured in subjective norms has been related to intention and behaviour with older adults (Michels & Kugler, 1998). However, since subjective norms have not consistently been related to physical activity behaviours (Smith & Biddle, 1999), conformity not emerging as a unique factor in the present study may have some support within the literature.

The majority of items assessing influences from family loaded together on one factor with little distinction being made between types. This factor included two items from each of modelling, compliance, and conformity, as well as a single item reflecting obedience. All of these types loaded together showing a common variance among these items. This is in contrast to the other channels within this older female population, as well as the adolescent population investigated by Spink (2003), where separate types for family influence emerged.

Several possible explanations exist for having these types lump together for the family channel. One possibility could be that the types of family influences in older adults are not important, but rather just that the individual receives influence from a family member. Another possibility could be that older females were unable to distinguish between the wordings of the items to separate the items into types. However, since the same questions were asked for each channel, and different types emerged with the other channels, this latter possibility seems less plausible. Further research will be needed to evaluate whether this absence of types from family influences is an artefact of the current sample or if family influences in general are more important than specifying specific types.

Having provided some support for the presence of channels and types of social influence in older females, the next step was to examine whether these social influences would be associated with physical activity levels. The results revealed that social influences along with perceived health were significant predictors of physical activity levels, correctly classifying 70% of the participants into active and insufficiently active groups, and explaining 19.4% of the variance. Social influence factors were found to

build upon the explanatory power of perceived health as depicted from the hierarchical analysis by adding 11.9% in explained variance over and above the 7.5% of variance explained by perceived health itself.

In terms of the specific results, perceived health and friends – obedience/compliance were associated with the active group. The fact that perceived health was positively associated with the active group is supported by the literature, where a similar association between physical activity and health in older adults has emerged (Conn, 1998; Conn et al., 2003).

The emergence of friends – obedience/compliance as a social influence that was related to being active enough for health benefits has not been identified previously in an older female population. However, there is existing research which may provide support for this type of relationship. For instance, research has found that an individual who possesses a knowledge base often is perceived to have the authority to give commands (Laupa, 1991). It could be speculated that friends who are giving orders for activity also may be active, and older adults may perceive these active friends as having a knowledge base in physical activity. In addition, it has been found that individuals are more likely to comply with a request if they spend time with the channel or share similarities with the channel (Burger et al., 2001). Given that it could be assumed that individuals would both spend time with and share similarities with their friends, it logically follows that they might be more apt to comply with a request from a friend. Further, requests that peak an individual's interest show better rates of compliance than requests that do not (Rind, 1997), so participants who are currently active may be more interested in complying with requests that pertain to physical activity.

One of the social influence factors associated with the inactive group was family influences. Given that Spink (2003) found all types of social influences predicted higher levels of physical activity in adolescents, the finding that this social influence loaded on the insufficiently active group was unexpected. There are several possible explanations that may help to explain this result. First, the question used in this study only asked if the channel and type influenced the participants' activity level and did not specify whether the influence was positive – increasing the activity level, or negative – decreasing the activity level. Chogahara (1999) found negative social influences in older adults related to less physical activity, and since the current questionnaire did not specify the direction of influence (i.e., increase or decrease in activity), it may be a possibility that family influences were negative and associated with a decrease in activity. Support for this type of reasoning was captured during the focus group when one participant mentioned a negative influence she received from her husband:

well when we first got married, my husband thought he was going to teach me to run and I ended up with all sorts of problems and he more or less told me I was wasting his time. So that kind of shuts you off.

In future, the questionnaire should be altered to specify an “increase” in activity level in order to alleviate this possible source of confusion.

Another possible explanation could be that the social influences important to increasing an individual's physical activity level could be related to the amount of physical activity they are performing. For instance, individuals who are insufficiently active may require or receive different influences than those who are active enough for health benefits. The literature shows that different activity levels may have different predictors. For example, Eyler and colleagues (1999) demonstrated that social support

was important for predicting whether an individual would be sedentary or not.

However, they found social support was not a predictor for determining if an individual was a regular exerciser or not (Eyler et al., 1999). This suggests that social influences may play a different role depending upon the activity level of the individual.

In terms of other possible explanations, it also is possible that the two groups examined in this study reflect those who are just starting to be physically active (initiation) and those who have been active for a long period of time (maintenance). Within this specific sample, almost one third of the individuals in the insufficiently active group (31.3%) had been active for less than six months whereas of those in the active group, only 3.4% had been active for less than six months. When looking at those who had been active for more than five years, the majority of individuals who were in the active group had been active for more than five years (79.3 %) whereas of those individuals in the insufficiently active group, only 59.4 % had been active for more than five years. Given this composition of the two groups, it is possible that the relationships found between social influence and physical activity in this study may be a result of those who are maintaining physical activity compared with those who are just initiating physical activity as much as reflecting different levels of energy expenditure, as proposed in this study. Given that research has found different predictors for exercise when comparing initiation to maintenance of physical activity (Litt, Kleppinger, & Judge, 2002), suggests that this speculation may be plausible, and as such, deserves future attention.

Almost 80% of those in the sufficiently active group had been active for more than five years. This may explain why healthcare workers – obedience/compliance did

not load with the active group. It could be reasoned that an order (obedience) or request (compliance) from a healthcare worker might be effective in prompting initial behaviour change to be active, but one wonders about its impact after several years of engaging in the behaviour. It is possible that its influence is no longer required. Examining the relationship among social influences and physical activity behaviours over time would be one way to examine this speculation.

As well, with this specific sample, it also may be worth pointing out that the social influences associated with the insufficiently active group may actually be playing a positive role in influencing physical activity. Since the question asked if their activity level was influenced by any of the channels or types, it is possible that without these influences from family, this group could have been even less active than they currently were and may indeed have been a sedentary group rather than an insufficiently active group without these family social influences.

The results of this study also revealed some support for interactions between channels and types of social influence, with different types of influence loading with similar channels. For instance, friends – obedience/compliance loaded with the high active group whereas friends – modelling tended to load with the insufficiently active group. Another example of an interaction that emerged was reflected in the fact that in other instances the type of modelling had a different influence depending upon the channel. For example, friends – modelling loaded with the insufficiently active group whereas healthcare workers – modelling loaded with the active group, albeit modestly. A third example of a channel X type interaction that emerged was healthcare workers – modelling, which loaded modestly with the active group whereas healthcare workers –

obedience/compliance did not load with either group. These examples of channel X type interactions suggest that the interaction of channel and type of social influence may play a different role in impacting physical activity behaviour. Spink (2003) also showed an interaction between channel and type with peer compliance having a stronger effect on physical activity than peer conformity in a youth sample. Given that some support for interactions between channels and types was found within this sample, the current findings support the importance of looking at both channel and type in older females.

To summarize this section, it appears that channels and types are both important in examining social influence, and different combinations of channel and type may have a differential impact on physical activity levels. The present results provide some support for the presence of channels and types among social influences for physical activity in older adults.

In the current study, it is worth noting that only five out of a possible twelve combinations of channel X type interaction emerged in the factor analysis. Within the factor analysis, only the influences of modelling from friends and healthcare workers clustered as separate factors. In all of the other factors, a combination of different types emerged (e.g., obedience and compliance loading together to form factors with both friends and healthcare workers). It is not known whether the other channels and types did not emerge from the factor analysis because the questionnaire was not sensitive enough to distinguish between these channels and types or these channels and types are not important and do not exist in the current sample of older females.

Further, in the case of family influences, the different types of social influence tended to cluster together making it impossible to determine the influence of separate types. It was not clear whether these types clustered together because the participants had difficulty understanding the differences between the types for this channel or if family was a channel of influence where the specific type of influence was less important.

Even within the focus groups, not all 12 different channel X type interactions were mentioned by participants. Eight possible combinations were mentioned and the four combinations that were not mentioned were friends – obedience, family – obedience, family – conformity, healthcare workers – conformity, and healthcare workers – modelling.

In contrast to Spink (2003), who found that all the types of social influence impacted physical activity levels, the current study of older females found that obedience, compliance, and conformity did not load as separate types in the factor analysis and only modelling emerged as a distinct factor. However, not having all the types of social influence emerge from the factor analysis also could be due to trouble that participants may have had in distinguishing between each type of social influence. This could be due to the inability of participants to discriminate between items designed to assess different types of influence when items are semantically similar. For instance, participants may have had trouble distinguishing between having an individual direct you to be active, which is an obedience item, and having an individual request that you do physical activities, which is a compliance item. This may be one reason that both of these items loaded upon a single factor in the current study.

Since a questionnaire was developed specifically for this study, it is important to evaluate the utility of this questionnaire in assessing the channels and types of social influence. First, this questionnaire was developed by using a combination of sources including the focus group discussions and the social psychology literature. Items were then created to reflect each of the types of social influence. However, since all the types of social influence did not emerge as separate factors in the factor analysis, further refinements should be done to the wording of each of the questions in an attempt to clarify for the participants the distinction between the different types of influence.

Examination of the completed questionnaires also revealed that there were questions that were left blank. A number of reasons could be forwarded to explain why participants left these questions unanswered. One possibility is the participant did not want to answer the question. However, it also is possible that some questions could have been left blank because the participant did not know how to respond. For instance, when administering the questionnaire some participants said they did not know what to answer for family influences since they no longer had any family. When the researcher was asked this question, the researcher's response was to answer "not at all" since they were not receiving any influence from that channel. However, other participants who did not voice this concern may have left the questions blank rather than provide an answer. Perhaps there needs to be an additional answer category for not interacting with that channel (e.g., no family or does not see a healthcare worker), which would signify receiving no influence from that channel. This would provide a distinction that is not evident within the current response set between those individuals who are not receiving

influence from that channel and those individuals whose activity is not influenced by that channel.

As mentioned previously, not specifying the direction of the influence may have created some confusion. As such, it was not known if the influences that loaded with the insufficiently active group had a positive or negative impact, since both positive and negative social influences have been observed with older adults (Chogahara, 1999). The questionnaire should be modified to reflect an increase in activity level not just a change in activity.

As suggested by Mahoney, Thombs, and Howe (1995), following a factor analysis, steps should be taken to assess the reliability of the scale, the interdependence of subscales and validity of the scale. It is possible to assess two types of reliability (Mahoney et al., 1995): internal consistency and temporal stability. Within the current study, the high levels of internal consistency (Cronbach alphas ranging from 0.87 to 0.94) provide initial support for the reliability of the factors. However, further research will have to be done to provide temporal stability reliability through a test-retest procedure to evaluate the stability of these social influence factors over time.

Regardless of the possible problem with the semantics of some of the questions, the emergence of separate factors denoting types and channels provides some support for the content validity of this questionnaire. Preliminary support for the concurrent validity of this questionnaire is provided by finding that the social influences were effective in classifying individuals into active and insufficiently active groups. These social influences explained approximately 12% of the variance over and above perceived health in predicting physical activity, providing some preliminary support for

the criterion validity of this questionnaire. Further research needs to establish the construct validity of this questionnaire by comparing these influences to other constructs that would be expected to be related such as self-efficacy, given that social support has been found to indirectly influence physical activity through self-efficacy (Duncan & McAuley, 1993).

Preliminary support is provided for the reliability and validity of this questionnaire and although not all of the types of social influence emerged as subscales within this population of older women, it is suggested that this questionnaire should be modified and continue to be used in assessing the social influence channels and types in various populations. However, steps should be taken to make the questions clearer and make it easier to distinguish between the different types of social influence. As discussed previously, some of these steps include specifying an increase in activity level, trying to clarify the wording to make distinguishing between different types easier, and possibly providing an option to distinguish between not receiving the influence and not being influenced by it.

6.1 Future Directions

Several future directions emerge from these two studies. First, is the need for replication of social influence channels and types within older adults as well as in other populations. Since exploratory factor analysis was used, which can be sample specific and data-driven, replication in other samples is needed to further explore these channels and types (Tabachnick & Fidell, 2001). Additionally, the present study only examined older females so future studies should explore whether the same social influence channels and types are important among older males. Kaplan and colleagues (2001)

found that social support predicted physical activity levels in older women but was not a significant predictor in older men suggesting a need to examine males and females separately.

Additionally, since the social influences that emerged in the current study are different from the channels and types that emerged with an adolescent population (Spink, 2003), it is important to continue to evaluate whether other populations such as younger adults have similar influences. In addition, Spink (2003) used an open-ended question to assess the social influences and then coded and categorized the responses into channels and types. Although the questionnaire would have to be modified to represent relevant channels of influence (e.g., coaches and teachers), it would be interesting to evaluate the questionnaire designed for this study in an adolescent population and then compare the influences that emerged from Spink's (2003) original work.

With regard to the influence of channels and types on physical activity, it is possible that other variables may have an impact on this relationship and may act as moderators. For instance, the influences may be different for individuals who are initiating physical activity versus maintaining physical activity as was speculated above. Specifically, the physical activity history of an individual (i.e., initiation compared with maintenance) may be a moderator in the social influence relationship with physical activity. Another possible moderator of this relationship could be motivation. It may be that individuals who are self motivated as was discussed within the focus groups are less likely to be influenced by others. For example, individuals who are highly intrinsically motivated may be receiving social influences but these influences may not be playing a

role in that individual's physical activity. However, for an individual who is not intrinsically motivated the external influences coming from others may play a more important role in their physical activity behaviour. As environmental influences also were identified in the focus groups as being important influences on physical activity, it might be important to examine whether the effects of various social influences on physical activity behaviour are moderated by factors such as perceived safety and proximity to appropriate facilities.

Another variable to investigate might be time perspective. Within the literature, the time perspective of an individual (i.e., focus on short-term or long-term outcomes) has been reported to be related to willingness to engage in various health behaviours (Fong & Hall, 2003). Differing time perspectives are thought to play a role in the effectiveness of interventions for behaviour change including altering physical activity behaviour (Fong & Hall, 2003). This distinction between those individuals with long-term versus short-term time perspective may be especially important in older adults who may perceive their time as finite. Exploring the impact that the time perspective of an individual has upon his or her receptiveness to social influence for physical activity may be important.

The presence of different types of family influence needs to be further investigated. The results from the current focus groups provide some support for the different types of social influence found by Spink (2003), but complete support for different types was not found with the factor analysis. As the distinction was made within the focus group for different types of family influences, further investigation

should evaluate whether the clustered family influence generalizes to other samples of older women or if it is unique to the current sample.

As alluded to when discussing the questionnaire, further steps should be taken to modify this questionnaire as well as develop its reliability and validity. This questionnaire should be further developed to make the distinction between types of influence clearer as well as the impact that influences have on increasing physical activity. This is especially the case with conformity, which was not observed in the factor analysis at all. As discussed before, test-retest reliability has not been carried out in the current study, so subsequent studies would need to evaluate the stability of the subscales of social influence.

Although all the interactions of channel and type were not observed within this sample, it is suggested that further research should include all possible combinations of channels and types. Even though the current study found only a partial model with not all of the interactions emerging from the factor analysis, further research refining the questionnaire wording may help to clarify the salient interactions among older adults and help in identifying the important channels and types for this population.

Another limitation of the current study may have been the inability of participants to discern differences among the types of influence that may have contributed to not finding all the types of social influence that were found by Spink (2003). The ability for some participants to read and comprehend the questions may have been limited in participants who had a reduced cognitive ability or participants who had English as a second language. Especially with an older adult population, the mental ability to complete the questionnaire is of concern. Similarly, the current sample

included some individuals who had English as a second language. It is quite possible that these individuals may have had trouble making the distinction in wording between the different types of social influence. Further studies assessing the channels and types of social influence in older adults should include a measure to test participants' literacy as well as mental competency in order to reduce variation associated with not comprehending the nuances of the questions.

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Appendix A – Consent Form For Focus Groups

University of Saskatchewan
Research Project Consent Form
Social Influence and Physical Activity Study

You are invited to participate in a study entitled Social Influence and Physical Activity. Please read this form carefully and feel free to ask any questions you may have.

Kathleen Wilson, Graduate Student, College of Kinesiology, 966-1123

or

Dr. Kevin S. Spink, Professor, College of Kinesiology, 966-1074

Purpose and Procedures

The purpose of this research study is to examine different types of social influence as they relate to physical activity.

If you volunteer to participate in this study, you will be asked to participate in a discussion that will explore your experiences with regard to social influence and physical activity. This focus group will last between 1 to 2 hours and will be audio taped. Each focus group interview will be transcribed. Any names, or identifying characteristics will be removed from the transcripts at this point. After your focus group, and prior to the data being included in the final report, you will be given the opportunity to review the transcript of your focus group, and to add, alter or delete information from the transcripts as you see fit. If you consider yourself active, you will be placed in a focus group with other active participants. If you are thinking about becoming active, you will be placed in a focus group with other similar participants. There also will be separate focus groups for males and females.

Potential Risks

Participation in this study presents no anticipated risks.

Potential Benefits

As a participant, you may be making important contributions to the research literature. We cannot and do not guarantee or promise that you will receive any direct benefits from the study.

Storage of Data

The original audio tapes and transcripts from these tapes will be safeguarded and securely stored in a locked filing cabinet in the office of K. Spink at the University of Saskatchewan for a minimum of five years as per University requirements.

Confidentiality

Although the data from this study will be published and presented at conferences, the data will be presented as quotes from the focus groups with all identifying information

Appendix A (con't)

removed. The quotes will be reported with the gender and general activity level of the individual only, so that it will not be possible to identify individuals. Moreover, the consent forms will be stored separately from the transcripts, so that it will not be possible to associate a name with any given information on the transcripts.

As a member of this focus group, it is your responsibility to protect the confidentiality and anonymity of your fellow participants. Please do not discuss either your fellow participants or the contents of this focus group with anyone else.

Right to Withdraw

You may withdraw from the study for any reason, at any time, without penalty of any sort. Any individual questions during the focus group discussions that you do not feel comfortable answering do not have to be answered. If you withdraw from the study at any time, any data that you have contributed will be destroyed.

Questions

If you have any questions concerning the study, please feel free to ask at any point. You are free to contact the researcher at the number provided above if you have questions at a later time. The University of Saskatchewan Behavioral Sciences Research Ethics Board has approved this study on ethical grounds on February 24, 2004. Any questions regarding your rights as a participant may be addressed to that committee through the Office of Research Services (966-2084). At your request, a summary of the results of this study will be made to you following study completion.

If you have any questions about this study, please feel free to contact Kathleen Wilson at (306) 966-1123 or Dr. Kevin Spink at (306) 966-1074.

Consent to Participate

I have read and understood the description provided above. I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I consent to participate in the study described above, understanding that I may withdraw this consent at any time. A copy of this consent form has been given to me for my records. In addition, I agree to protect the confidentiality and anonymity of my fellow participants. I will not discuss either the content or who was involved in this focus group with anyone else.

Signature of Participant

Date

Signature of Researcher

Date

Appendix B – Semi-structured Interview Guide

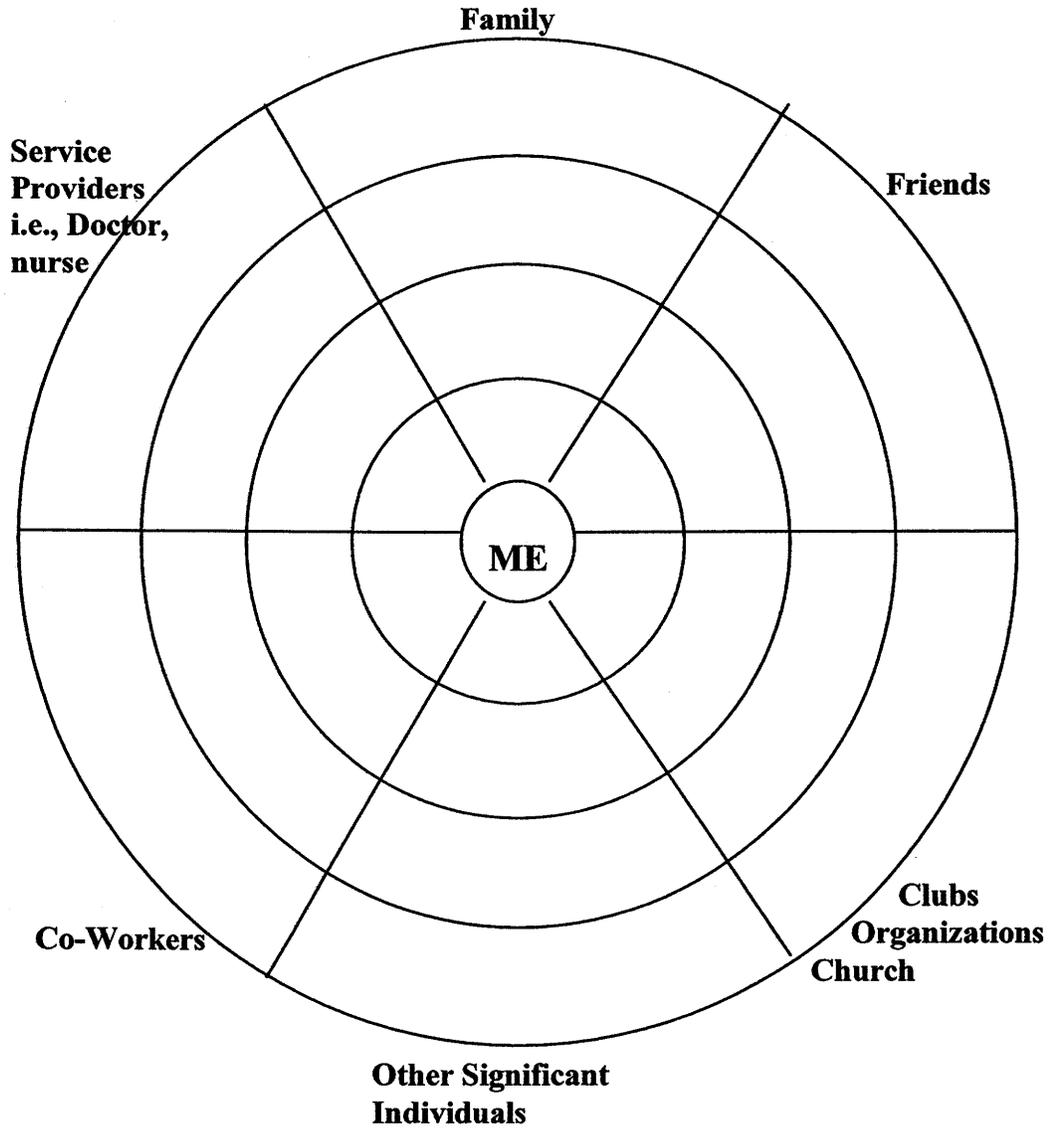
Focus Group Discussion Questions:

- First off, I am interested in what sorts of physical activities you do? As well, how long have you been active?
- Now, I'm interested in people who have influenced you to be active. Let's do a circle map (see following page) with who has influenced our physical activities. With this map, just write the initials of individuals who have influenced you to do physical activities. Then describe their relationship to you
- Now that each of us has completed a map of who has influenced us to be active, let us use it as a starting point (see following page) to discuss the different ways that they influence you:
 - Take someone from your map who was important in you being active, what did they do to make you want to be active?
 - Did ever seeing some one being active make you want exercise?
 - What about telling you or ordering you to be active?
 - How about wanting to become active because the people you are around are active?
 - What about wanting to become more active because others wanted you to do it or suggested that you do it?
 - Do you think these influences worked? Did they make you want to become more active? How did you react to these influences?
- We have discussed many influences that are important to each of us. Which influence is most important overall? Why do you think that this influence is the most important?
- Do you think the amount of influence an individual receives is important?
- Is just having one person influence you sufficient for you to increase your activity level or do you need to accumulate a certain amount before increasing your activity level?

GENERAL

- Does where an individual live make a difference in the influences that they receive or are important? Does it matter if an individual lives alone in a house or with others?
- What do you think you would do if these people no longer influenced you?
- Do you think an individual's health is related to the type of influences that they receive or that would be important to them?

Appendix C – Circle Map



Appendix D – OA-ESI (O'Brien-Cousins, 1996)

How active were you in the past 7 days?

Instructions: How much time in minutes did you spend on these activities **in the past week?** Add your own activities if they are not listed here.

WORK ACTIVITIES (activities relating to employment or housework) Time spent in Minutes on each occasion

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Sweaty outdoor work	_____	_____	_____	_____	_____	_____	_____
Light outdoor work	_____	_____	_____	_____	_____	_____	_____
Sweaty work in home	_____	_____	_____	_____	_____	_____	_____
Light work in home	_____	_____	_____	_____	_____	_____	_____
Other sweaty work	_____	_____	_____	_____	_____	_____	_____
Other light work	_____	_____	_____	_____	_____	_____	_____

LEISURE ACTIVITIES Time spent in Minutes on each occasion

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Aerobic Fitness Class	_____	_____	_____	_____	_____	_____	_____
Aquacise Class	_____	_____	_____	_____	_____	_____	_____
Aqua-jogging	_____	_____	_____	_____	_____	_____	_____
Badminton	_____	_____	_____	_____	_____	_____	_____
Bocce Ball	_____	_____	_____	_____	_____	_____	_____
Cycling (easy)	_____	_____	_____	_____	_____	_____	_____
Cycling (moderate)	_____	_____	_____	_____	_____	_____	_____
Cycling (sweaty)	_____	_____	_____	_____	_____	_____	_____
Birdwatching	_____	_____	_____	_____	_____	_____	_____
Bowling (all)	_____	_____	_____	_____	_____	_____	_____
Calisthenics	_____	_____	_____	_____	_____	_____	_____
Canoeing	_____	_____	_____	_____	_____	_____	_____
Kayaking	_____	_____	_____	_____	_____	_____	_____
Curling	_____	_____	_____	_____	_____	_____	_____
Dancing: Line	_____	_____	_____	_____	_____	_____	_____
Dancing: Hawaiian	_____	_____	_____	_____	_____	_____	_____
Dancing: Ballroom	_____	_____	_____	_____	_____	_____	_____
Dancing: Ballet	_____	_____	_____	_____	_____	_____	_____
Dancing: Square	_____	_____	_____	_____	_____	_____	_____
Dancing: Tap	_____	_____	_____	_____	_____	_____	_____

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Dancing: Folk	_____	_____	_____	_____	_____	_____	_____
Darts	_____	_____	_____	_____	_____	_____	_____
Fishing (ice)	_____	_____	_____	_____	_____	_____	_____
Fishing (lure)	_____	_____	_____	_____	_____	_____	_____
Fly Fishing	_____	_____	_____	_____	_____	_____	_____
Gardening	_____	_____	_____	_____	_____	_____	_____
Golf	_____	_____	_____	_____	_____	_____	_____
Gymnastics	_____	_____	_____	_____	_____	_____	_____
Hiking: on level ground	_____	_____	_____	_____	_____	_____	_____
Hiking: on hilly ground	_____	_____	_____	_____	_____	_____	_____
Horseshoes	_____	_____	_____	_____	_____	_____	_____
Jogging (slow)	_____	_____	_____	_____	_____	_____	_____
Jogging (fast)	_____	_____	_____	_____	_____	_____	_____
Pilates	_____	_____	_____	_____	_____	_____	_____
Resistance Training	_____	_____	_____	_____	_____	_____	_____
Rebounding (tramp)	_____	_____	_____	_____	_____	_____	_____
Rope Skipping	_____	_____	_____	_____	_____	_____	_____
Rowing Machine	_____	_____	_____	_____	_____	_____	_____
Running	_____	_____	_____	_____	_____	_____	_____
Skating	_____	_____	_____	_____	_____	_____	_____
Skiing downhill	_____	_____	_____	_____	_____	_____	_____
Skiing cross country	_____	_____	_____	_____	_____	_____	_____
Snooker	_____	_____	_____	_____	_____	_____	_____
Snowshoeing	_____	_____	_____	_____	_____	_____	_____
Stair Climbing	_____	_____	_____	_____	_____	_____	_____
Stretching exercises	_____	_____	_____	_____	_____	_____	_____
Swimming lengths	_____	_____	_____	_____	_____	_____	_____
Swimming (wading)	_____	_____	_____	_____	_____	_____	_____
Table Tennis	_____	_____	_____	_____	_____	_____	_____
Tai Chi	_____	_____	_____	_____	_____	_____	_____
Tennis singles	_____	_____	_____	_____	_____	_____	_____
Tennis doubles	_____	_____	_____	_____	_____	_____	_____
Walking (stroll)	_____	_____	_____	_____	_____	_____	_____
Walking (moderate)	_____	_____	_____	_____	_____	_____	_____
Walking (brisk)	_____	_____	_____	_____	_____	_____	_____
Weightlifting	_____	_____	_____	_____	_____	_____	_____
Yoga	_____	_____	_____	_____	_____	_____	_____

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Other: _____	_____	_____	_____	_____	_____	_____	_____
Other: _____	_____	_____	_____	_____	_____	_____	_____
Other: _____	_____	_____	_____	_____	_____	_____	_____

Appendix E – Social Influence Questionnaire

Who has influenced you to be physically active?

In this section, we are interested in how others currently influence you to be active: specifically how your friends, family (e.g., spouse, children, grandchildren) and healthcare workers (e.g. doctor, physiotherapist) influence you.

Although some questions may seem repetitive, please answer all questions.

Please circle the appropriate response.

1. How much does having the following individuals suggest that you do physical activities influence your activity level?

Friends

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Family (e.g., spouse, children, grandchildren)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Healthcare workers (e.g., doctor, physiotherapist)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

2. How much is your activity level influenced because you want to fit in with the following individuals?

Family (e.g., spouse, children, grandchildren)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Healthcare workers (e.g., doctor, physiotherapist)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Friends

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Appendix E (con't)

3. How much does having the following individuals directing you to be active influence your activity level?

Healthcare workers (e.g., doctor, physiotherapist)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Friends

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Family (e.g., spouse, children, grandchildren)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

4. How much is your activity level influenced by simply observing the following individuals be active?

Friends

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Family (e.g., spouse, children, grandchildren)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Healthcare workers (e.g., doctor, physiotherapist)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

5. How much does having the following individuals ask you to do physical activities influence your activity level?

Family (e.g., spouse, children, grandchildren)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Healthcare workers (e.g., doctor, physiotherapist)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Friends

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Appendix E (con't)

6. How much is your activity level influenced because it is what the following individuals expect you to do?

Healthcare workers (e.g., doctor, physiotherapist)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Friends

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Family (e.g., spouse, children, grandchildren)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

7. How much does having the following individuals telling you to be active influence your activity level?

Friends

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Family (e.g., spouse, children, grandchildren)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Healthcare workers (e.g., doctor, physiotherapist)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

8. How much does simply seeing the following individuals be active affect your activity level?

Family (e.g., spouse, children, grandchildren)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Healthcare workers (e.g., doctor, physiotherapist)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Friends

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Appendix E (con't)

9. How much is your activity level influenced because the following individuals are doing it as well?

Healthcare workers (e.g., doctor, physiotherapist)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Friends

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Family (e.g., spouse, children, grandchildren)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

10. How much does having the following individuals request that you do some physical activities influence your activity level?

Friends

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Family (e.g., spouse, children, grandchildren)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Healthcare workers (e.g., doctor, physiotherapist)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

11. How much does having the following individuals ordering you to be active influence your activity level?

Family (e.g., spouse, children, grandchildren)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Healthcare workers (e.g., doctor, physiotherapist)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Friends

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Appendix E (con't)

12. How much does *exposure* to the following individuals engaging in physical activity influence your activity level?

Healthcare workers (e.g., doctor, physiotherapist)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Friends

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Family (e.g., spouse, children, grandchildren)

1	2	3	4
Not at all	A Little Bit	Somewhat	Very much

Appendix F – Demographic Questions

Age: _____

How long have you been physically active (e.g., walking, gardening, fitness classes) at least 3 or more times/week?

- _____ I am currently not active
- _____ I have been active for less than 6 months
- _____ I have been active for between 6 months and 1 year
- _____ I have been active for between 1 and 5 years
- _____ I have been active for more than 5 years

Appendix G – Informed Consent for Questionnaire

University of Saskatchewan **Research Project Consent Form** **Social Influence and Physical Activity Study**

You are invited to participate in a study entitled Social Influence and Physical Activity. Please read this form carefully and feel free to ask any questions you may have.

Kathleen Wilson, Graduate Student, College of Kinesiology, 966-1123

or

Dr. Kevin S. Spink, Professor, College of Kinesiology, 966-1074

Purpose and Procedures

The purpose of this research study is to examine the different types of social influence as they relate to physical activity.

If you volunteer to participate in this study, you will be asked to complete a questionnaire that asks questions about yourself, your current physical activity, and who has influenced you to be active. This questionnaire will take about 15 to 20 minutes to complete.

Potential Risks

Participation in this study presents no anticipated risks.

Potential Benefits

As a participant, you may be making important contributions to the research literature. We cannot and do not guarantee or promise that you will receive any direct benefits from the study.

Storage of Data

The original questionnaires will be safeguarded and securely stored in a locked filing cabinet in the office of K. Spink at the University of Saskatchewan for a minimum of five years as per University requirements.

Confidentiality

Although the data from this study will be published and presented at conferences, the data will be reported in aggregate form, so that it will not be possible to identify individuals. Moreover, the consent forms will be stored separately from the questionnaire, so that it will not be possible to associate a name with any given information on the questionnaire. Please do not put your name or other identifying information on the questionnaire.

Appendix G (con't)

Right to Withdraw

You may withdraw from the study for any reason, at any time, without penalty of any sort. Any individual questions on the questionnaire that you do not feel comfortable answering can be left blank. If you withdraw from the study at any time, any data that you have contributed will be destroyed.

Questions

If you have any questions concerning the study, please feel free to ask at any point. Also, you are free to contact the researcher at the number provided above if you have questions at a later time. The University of Saskatchewan Behavioral Sciences Research Ethics Board has approved this study on ethical grounds on February 24, 2004. Any questions regarding your rights as a participant may be addressed to that committee through the Office of Research Services (966-2084). At your request, a summary of the results of this study will be provided to you following study completion.

If you have any questions about this study, please feel free to contact Kathleen Wilson at (306) 966-1123 or Dr. Kevin Spink at (306) 966-1074.

Consent to Participate

I have read and understood the description provided above. I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I consent to participate in the study described above, understanding that I may withdraw this consent at any time. A copy of this consent form has been given to me for my records.

Signature of Participant

Date

Signature of Researcher

Date

Appendix H – Correlations of Conceptual Grouping of Items

Table H.1: Correlations between Factors based upon Conceptual Model

Factors	1	2	3	4	5	6	7	8	9	10	11	12
1 Compliance – Friends	1											
2 Compliance – Family	.647	1										
3 Compliance – Healthcare workers	.515	.549	1									
4 Conformity – Friends	.813	.640	.465	1								
5 Conformity – Family	.574	.846	.518	.671	1							
6 Conformity- Healthcare workers	.529	.540	.789	.565	.535	1						
7 Obedience – Friends	.804	.582	.482	.774	.563	.632	1					
8 Obedience – Family	.608	.778	.540	.630	.779	.620	.727	1				
9 Obedience – Healthcare workers	.436	.537	.861	.419	.495	.736	.526	.586	1			

10	Modelling – Friends	.695	.581	.413	.813	.608	.505	.723	.577	.379	1		
11	Modelling – Family	.548	.859	.478	.615	.877	.529	.564	.742	.469	.671	1	
12	Modelling – Healthcare Workers	.456	.527	.726	.498	.534	.847	.530	.565	.701	.491	.558	1

Note: All correlations were significant at $p < 0.001$ ($N = 105$)

Appendix I – Factor Loading Matrix

Table I.1: Complete Factor Loading Matrix for Social Influence Questionnaire

					Component					
Channel	Type	Item #	Question	1	2	3	4	5	6	
1	Family	Compliance	1	How much does having the following individuals <i>suggest</i> that you do physical activities influence your activity level?	0.833	0.079	0.162	0.135	-0.144	0.013
	Family	Conformity	2	How much is your activity level influenced because you <i>want to fit in with</i> the following individuals?	0.729	0.053	0.278	0.067	0.144	0.151
	Family	Modelling	4	How much is your activity level influenced by simply <i>observing</i> the following individuals be active?	0.722	0.074	0.034	-0.024	0.163	-0.130
	Family	Modelling	8	How much does simply <i>seeing</i> the following individuals be active affect your activity level?	0.709	-0.107	-0.135	-0.168	0.193	-0.089
	Family	Conformity	9	How much is your activity level influenced because the following individuals are <i>doing it as well</i> ?	0.674	0.010	-0.267	-0.066	0.059	-0.389
	Family	Modelling	12	How much does <i>exposure</i> to the following individuals engaging in physical activity influence your activity level?	0.648	-0.009	-0.157	-0.015	0.165	-0.330
	Family	Conformity	6	How much is your activity level influenced because it is what the following individuals <i>expect you to do</i> ?	0.643	0.169	0.003	-0.288	-0.065	-0.039
	Family	Compliance	5	How much does having the following individuals <i>ask</i> you to do physical activities influence your activity level?	0.616	0.172	-0.028	-0.237	-0.081	-0.222
	Family	Obedience	3	How much does having the following individuals <i>directing</i> you to be active influence your activity level?	0.591	0.056	0.200	-0.148	0.187	-0.023
2	Healthcare Workers	Compliance	10	How much does having the following individuals <i>request</i> that you do some physical activities influence your activity	-0.072	0.855	-0.222	-0.082	0.063	-0.150

			level?							
	Healthcare Workers	Compliance	1	How much does having the following individuals <i>suggest</i> that you do physical activities influence your activity level?	0.080	0.853	0.251	0.223	-0.044	-0.040
	Healthcare Workers	Obedience	7	How much does having the following individuals <i>telling</i> you to be active influence your activity level?	0.082	0.843	-0.053	-0.059	0.095	0.103
	Healthcare Workers	Compliance	5	How much does having the following individuals <i>ask</i> you to do physical activities influence your activity level?	0.133	0.800	0.046	-0.041	0.096	0.025
	Healthcare Workers	Obedience	11	How much does having the following individuals <i>ordering</i> you to be active influence your activity level?	-0.073	0.684	-0.247	-0.216	0.010	-0.263
	Healthcare Workers	Obedience	3	How much does having the following individuals <i>directing</i> you to be active influence your activity level?	0.079	0.678	0.040	-0.068	0.173	0.062
	Healthcare Workers	Conformity*	6	How much is your activity level influenced because it is what the following individuals <i>expect you to do</i> ?	0.016	0.658	0.108	-0.145	0.252	0.102
3	Friends	Compliance	1	How much does having the following individuals <i>suggest</i> that you do physical activities influence your activity level?	0.263	-0.034	0.627	-0.118	-0.071	-0.275
	Friends	Conformity	2	How much is your activity level influenced because you <i>want to fit in with</i> the following individuals?	0.159	0.047	0.612	-0.107	0.117	-0.262
	Friends	Obedience	3	How much does having the following individuals <i>directing</i> you to be active influence your activity level?	0.096	0.117	0.515	-0.301	0.022	-0.240
4	Family	Obedience	11	How much does having the following individuals <i>ordering</i> you to be active influence your activity level?	0.146	0.071	-0.087	-0.812	0.064	0.161
	Friends	Obedience	11	How much does having the following individuals <i>ordering</i> you to be active influence your activity level?	-0.164	-0.015	0.283	-0.713	0.149	-0.090
	Friends	Obedience	7	How much does having the following individuals <i>telling</i> you to be active influence	0.032	0.030	0.035	-0.679	0.145	-0.202

	Friends	Compliance	10	your activity level? How much does having the following individuals <i>request</i> that you do some physical activities influence your activity level?	-0.071	0.272	0.202	-0.581	-0.029	-0.252
	Family	Obedience	7	How much does having the following individuals <i>telling</i> you to be active influence your activity level?	0.543	0.135	-0.085	-0.561	-0.057	0.130
	Friends	Conformity*	6	How much is your activity level influenced because it is what the following individuals <i>expect you to do</i> ?	0.213	0.011	0.217	-0.506	-0.035	-0.276
	Family	Compliance	10	How much does having the following individuals <i>request</i> that you do some physical activities influence your activity level?	0.439	0.199	-0.227	-0.465	0.003	-0.098
5	Healthcare Workers	Modelling	8	How much does simply <i>seeing</i> the following individuals be active affect your activity level?	0.059	0.210	-0.055	-0.073	0.699	-0.063
	Healthcare Workers	Modelling	4	How much is your activity level influenced by simply <i>observing</i> the following individuals be active?	0.118	0.318	0.172	0.025	0.667	0.077
	Healthcare Workers	Conformity**	9	How much is your activity level influenced because the following individuals are <i>doing it as well</i> ?	0.143	0.074	-0.204	-0.205	0.565	-0.219
	Healthcare Workers	Modelling	12	How much does <i>exposure</i> to the following individuals engaging in physical activity influence your activity level?	0.029	0.315	-0.094	-0.003	0.539	-0.294
	Healthcare Workers	Conformity	2	How much is your activity level influenced because you <i>want to fit in with</i> the following individuals?	-0.085	0.426	0.406	-0.090	0.484	0.038
6	Friends	Modelling	12	How much does <i>exposure</i> to the following individuals engaging in physical activity influence your activity level?	0.133	0.108	0.038	0.094	0.085	-0.827
	Friends	Conformity**	9	How much is your activity level influenced because the following individuals are <i>doing it as well</i> ?	0.052	0.117	0.121	-0.054	-0.069	-0.808

Friends	Modelling	8	How much does simply <i>seeing</i> the following individuals be active affect your activity level?	0.008	-0.125	0.142	-0.95	0.269	-0.723
Friends	Compliance	5	How much does having the following individuals <i>ask</i> you to do physical activities influence your activity level?	0.049	0.266	0.358	-0.305	-0.273	-0.429
Friends	Modelling	4	How much is your activity level influenced by simply <i>observing</i> the following individuals be active?	0.250	-0.134	0.252	-0.179	0.238	-0.427
Eigenvalues				18.232	3.480	2.299	1.620	1.357	1.024
% of Variance				50.644	9.666	6.386	4.501	3.769	2.844
Cumulative %				50.644	60.309	66.695	71.196	74.964	77.808
Rotation SSL				11.025	10.804	3.891	10.392	7.286	9.264

* These items initially of conformity ("expect") was reclassified to be related to obedience and compliance because of its loading.

** These items initially of conformity ("doing it too") was reclassified to relate to modelling because of its loading.

Appendix J - Ethics Approval



UNIVERSITY OF SASKATCHEWAN BEHAVIOURAL RESEARCH ETHICS BOARD

<http://www.usask.ca/research/ethics.shtml>

NAME: Kevin Spink (Kathleen Wilson)
College of Kinesiology

Beh 04-10

DATE: February 24, 2004

The University of Saskatchewan Behavioural Research Ethics Board has reviewed the Application for Ethics Approval for your study "Social Influence & Physical Activity in Older Adults: Understanding Channels & Types" (Beh 04-10).

1. Your study has been APPROVED.
2. Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Committee consideration in advance of its implementation.
3. The term of this approval is for 5 years.
4. This approval is valid for one year. A status report form must be submitted annually to the Chair of the Committee in order to extend approval. This certificate will automatically be invalidated if a status report form is not received within one month of the anniversary date. Please refer to the website for further instructions <http://www.usask.ca/research/behavrsc.shtml>

I wish you a successful and informative study.

Dr. David Hay, Acting Chair
University of Saskatchewan
Behavioural Research Ethics Board

DH/ek

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