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Acting One’s Age in Physical Exercise: Do Perceived Age Norms Explain Autonomous
Motivation among Older Adults?

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Abstract

Background: The Social Identity Approach (SIA) proposes that the more older adults identify with the social group of “older adults”, the more they will conform to what they perceive as being normative exercising for their group. However, so far it remains unclear why older adults adhere to these norms. **Objective:** This study evaluated whether perceived exercise norms are associated with higher levels of autonomous motivation according to the Self-Determination Theory (SDT) and actual exercise participation. **Method:** A cross-sectional survey, either by regular mail or online, was conducted among 409 older adults in Flanders (Belgium). **Results:** Our analyses revealed that older adults who perceived more positive older adult norms for exercising were more autonomously motivated to exercise. In explaining 24% of their exercise motivation, older adults’ perceptions of the exercise norms for older adults predicted 6% of their exercise participation. **Conclusion:** Our findings suggest that SIA and SDT can be meaningfully integrated.

Keywords: Seniors, Physical Activity, Social Identity Approach, Self-Determination Theory, Survey.

For decades life expectancy has increased steadily in developed countries (World Health Organisation, 2006). Consequently the number of older adults will increase accordingly. Ageing is associated with higher risks for chronic disorders. Studies have shown that a sufficient level of physical activity could prevent the development of such chronic conditions (OECD, 2006). However, various studies have also shown that adherence and long-term maintenance of physical activity is difficult among older adults (Arbesman & Mosley, 2012).

The Social Identity Approach (SIA; Haslam, 2004) proposes that when people consider themselves to belong to a group, such as the age group ‘older adults’, and when they identify themselves as a member of this group, they will consider the norms of this group as their own (Tarrant & Butler, 2011). A number of studies have indeed shown that the more people define themselves in terms of a social identity, the more they perceive the behavioural norms associated with this social identity, including health behaviours such as exercising, to be their own (Christensen, Rothgerber, Wood, & Matz, 2004; Neighbors et al., 2010; Smith & Louis, 2009). As a result, they are likely to behave accordingly (Goldstein, 2008; Kallgren 2000; and Reed, 2007). However, the question remains why older adults behave accordingly. The motivational processes that underlie the adherence to social identity norms for (health) behaviours have only scarcely been examined. Moreover, they have never been considered in terms of the tenets of the dominant motivational theories.

The Self-Determination Theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000) constitutes the most widely used contemporary motivational theory, and its major assumptions have been consistently validated (for a review, consider Teixeira, Carraca, Markland, Silva, & Ryan, 2012; Wilson, Mack, & Grattan, 2008). SDT’s core assumption is that people better maintain their exercise involvement when their exercise motivation arises more from a self-intrinsic appreciation of exercising, and thus more originates from within their ‘self’. SDT

distinguishes between two types of motivation; autonomous and controlled motivation. Autonomous motivation refers to the motivation that originates from a predominantly self-intrinsic appreciation of exercising, whereas controlled motivation refers to the motivation that arises when exercise involvement is predominantly appreciated by our social environment (i.e., is appreciated self-extrinsically).

SDT proposes that (the extent of) autonomous motivation depends on the experienced satisfaction of three basic psychological needs: the basic needs for autonomy, competence and belongingness. It assumes that people are more autonomously motivated to exercise when the activity is in accordance with their personal preference (i.e., autonomy), when they experience that they are effective in their exercise involvement (i.e., competence), and when the activity results in feeling positively connected to others (i.e., belongingness). In confirmation, higher satisfaction of these three basic needs in exercise has consistently been associated with more autonomous exercise motivation and a more maintained exercise involvement (Teixeira et al., 2012). In the present paper, we will use the term experienced basic needs satisfaction (BNS) as a general term to describe each individual’s relative (or predicted) rating on an aggregate scale measuring their satisfaction of autonomy, competence and relatedness.

Social identity norms represent social information on what members of a social group, such as older adults, consider to be preferable behaviour. Following these norms indicates that they experience this behaviour to be effective in leading to valued outcomes, such as feeling positively connected to the group. We propose that when older adults identify themselves as an older adult (i.e., feel to belong to the group of older adults), and thus internalize the social older adult identity norms as their own, this identification and internalization will positively impact their experienced basic needs satisfaction, and consequently positively affect their autonomous motivation. In other words, the stronger older adults identify themselves as an older adult, the more they would be autonomously motivated to exercise in line with the

perceived exercise norms for older adults. Due to the stronger internalization of the social older adult identity norms, they would experience more BNS in exercising accordingly. A study by Amiot and colleagues (2014) has indeed shown that when people define themselves in terms of a social identity, they were more autonomously motivated to behave in a social identity congruent manner. However, so far no studies have evaluated whether social identity norms affect the autonomous motivation to exercise by determining the experience of BNS in exercising, and whether the extent of this influence depends on the degree of self-identification in terms of the social identity.

Therefore, this study aimed to evaluate the validity of the assumptions of our proposed integration of SIA and SDT. More specifically, we assessed whether older adults’ perceptions of their perceived social identity norms for exercising were associated with their autonomous exercise motivation by being related with their BNS. In addition, we tested whether these proposed associations would differ when older adults identified strongly as an older adult. More specifically, we hypothesized that older adults would perceive more BNS in exercise, the more they perceived that a) older adults exercise (i.e., descriptive norm), b) older adults are expected to (or *should*) exercise (i.e., injunctive norm), and c) exercising is normatively descriptive for older adults in comparison to younger adults (i.e., prototype norm) (Hypothesis 1a).

In addition, we predicted that these associations would be more positive the more older adults identified themselves as an older adult (Hypothesis 1b). We also hypothesized that in explaining perceived BNS in exercise, their perceptions of the social identity norms for exercise would indirectly explain their autonomous motivation to exercise (Hypothesis 2). Finally, we predicted that by explaining their autonomous exercise motivation, their perceptions of the social identity norms for exercising would indirectly explain their exercise

participation (Hypothesis 3). A schematic representation of the hypotheses is presented in Figure 1.

Method

Procedure

The present study was part of a larger survey study on social capital, social support, exercise motivation, and exercise involvement, among the older adults in Flanders, the Dutch-speaking region of Belgium (Scheerder et al., 2011). This survey study was conducted in collaboration with a social organization for older adults (i.e., 55 years old or older). For the present study, the 959 members who participated in this survey study were invited by letter to complete a questionnaire with regard to social group identification and perceived older adult norms.

They could complete the questionnaire on the Internet or on the paper copy that was attached to the letter. In case of non-participation, they were asked to complete the non-participation form. They were asked to return either the questionnaire or the non-participation form within six weeks. After three weeks, the non-responders were contacted by phone to remind them about the study. When they refused to participate in the study, their reason for non-participation was noted. This study was approved by the Ethics Committee of X. All participants signed an informed consent.

Measures

Older Adult Identification. Self-identification as an older adult was measured by a single Likert-scale asking the participants to indicate the extent that they considered themselves a 55-years-old-or-older adult. The participants marked their agreement with three items (i.e., “I feel ... (1) I am a 55-years-old-or-older adult; (2) I belong among 55-years-old-or-older adults; (3) I bond with other 55-years-old-or-older adults.”) on a Likert-scale ranging from (1)

‘completely disagree’ to (5) ‘completely agree’. Previous studies have shown that a single Likert-scale to measure social identification is valid and reliable (Postmes, Haslam, Jans, 2012). Exploratory factor analysis revealed that the items formed one scale of older adult identification (explained variance = 77.5%) that had high internal reliability (Cronbach’s $\alpha = .85$).

Older Adult Norms. Perceptions of three types of older adult (social) identity norms (Descriptive, Injunctive and Prototype) were measured in line with general recommendation for measuring social norms (Mackie et al. 2015). It is recommended to identify the social group (reference group) and to measure beliefs about what others do by means of a Likert-scale.

Descriptive. The participants reported their perception of how many of the older adults in society exercise on a Likert-scale that ranged from (0) ‘0% - None of the 55-years-old-or-older adults in society exercise’ to (10) ‘100% - All 55-years-old-or-older adults in society exercise’.

Injunctive. The participants indicated their perception of their normative expectations of older adults with regard to exercise involvement by marking their agreement with the item “55-years-old-or-older adults should exercise” on a Likert-scale ranging from (1) ‘completely disagree’ to (5) ‘completely agree’.

Prototype. The participants were asked to report the degree they perceived exercise as prototypical (i.e., age normatively descriptive) for ‘55-years-old-or-older adults’ compared to individuals who are younger than 55. They reported this perception by completing the item “Exercisers are ...” by answering on a Likert-scale that ranged from (1) ‘all younger than 55 years old’ to (7) ‘all 55-years-old-or-older adults’.

Basic Needs Satisfaction (BNS). The perceived satisfaction of SDT’s three basic needs (i.e., autonomy, competence, and belongingness) in exercise involvement was measured with a short version (nine of the original 12 items) of the Basic Psychological Needs in Exercise

Scale (BPNES). The short version was set up for the purposes of this study. The BPNES has been successfully validated as supporting the three-needs model of SDT (Vlachopoulos & Michailidou, 2006). The nine items consisted of three items for each of the basic needs, i.e., autonomy (“I ... (1) want to exercise; (2) willingly choose to exercise; (3) prefer to spend my spare time exercising.”), competence (“I ... (1) am good in exercise; (2) am able to exercise; (3) have sufficient ability to exercise.”), and belongingness (“I ... (1) have a bond with exercisers; (2) feel to belong among exercisers; (3) am a genuine exerciser.”). The participants marked their agreement on a Likert-scale ranging from (1) ‘completely disagree’ to (5) ‘completely agree’. Exploratory factor analysis was performed on the data of this study to ascertain that this short version has similar psychometric properties compared to the original version. Our results revealed that the nine items formed one scale of perceived BNS (explained variance = 72.2%) with an excellent internal reliability (Cronbach’s $\alpha = .95$), which is comparable with the 12-items version (Vlachopoulos & Michailidou, 2006).

Exercise motivation. The type of motivation of the participants was measured with a modified Behavioral Regulation in Exercise Questionnaire (BREQ; Markland & Tobin, 2004). Four types of motivation that SDT proposes to exist (i.e., intrinsic, identified, introjected and external motivation) were measured with 12 items (three items per type of motivation). At the time of this study it was already recognized in the literature that integrated motivation should be part of exercise motivation, therefore three additional items were added (i.e., “I exercise because ... (1) it is an important part of who I am; (2) I feel I am my true self when I exercise; (3) I just would not be myself without exercising.”). The participants reported their agreement on a Likert-scale that ranged from (1) ‘completely disagree’ to (5) ‘completely agree’. An adapted version of the Relative Autonomy Index (RAI) was calculated. This index contrasts autonomous motives with controlled motives. It attributes a weight to each summed subscale. The RAI is calculated by taking the sum of these weighted subscales. In the present study the

RAI was adapted in order to include the subscale of integrated regulation. It was calculated with the formula: $RAI = (3 * \text{intrinsic regulation}) + (2 * \text{integrated regulation}) + (1 * \text{identified regulation}) + (-1 * \text{introjected regulation}) + (-2 * \text{external regulation})$. The minimum score for the RAI is -27 and the maximum score is +81. Higher positive scores for the RAI indicate more autonomous motivation whereas lower negative scores indicate less autonomous motivation.

Exercise Participation. Exercise participation was measured with the Godin Leisure-Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1997). The participants reported the number of times per week they participated in exercise activities of low, moderate, and high intensity of at least 20 continuous minutes during a normal (i.e., undisturbed by unusual life circumstances) week of the last month (i.e., four weeks). For each level of intensity, the number of activities was multiplied with the assigned metabolic equivalent value (MET) for this activity level. The total score is obtained by calculating the sum of these MET-weighted values: $GLTEQ \text{ total score} = (\text{low intensity} * 3 \text{ MET}) + (\text{moderate intensity} * 5 \text{ MET}) + (\text{high intensity} * 9 \text{ MET})$.

Analysis

Pearson correlations were calculated to observe the associations that exist between older adult identification, the older adult exercise norms (i.e., Descriptive; Injunctive; Prototype), BNS and exercise motivation (RAI), and exercise participation.

A Hierarchical Multiple Linear Regression of older adult identification, the older adult norms, and the products of older adult identification and these norms, on BNS was conducted in order to evaluate the associations that are hypothesized to exist between the older adult norms and BNS (Hypothesis 1a) and to evaluate the hypothesized moderation by older adult identification of these associations (Hypothesis 1b). Hayes’ Process analyses (Hayes, 2013) were conducted to evaluate the hypothesis that the older adult norms are indirectly related to

autonomous motivation in explaining BNS (Hypothesis 2), and with exercise participation in explaining exercise motivation (Hypothesis 3).

Prior to the analyses, older adult identification and the older adult norms were all mean-centered to avoid the potential multicollinearity that occurs when entering the main factors (identification and the norms) and the product of these main factors (i.e., the products of identification and the norms). Furthermore, Missing Value Analysis with the Estimation-Maximization Algorithm was used to complete any missing data.

All analyses were performed with IBM-SPSS 19. The PROCESS syntax for IBM-SPSS was used to perform the Hayes’ Process Analyses (Hayes, 2013). PROCESS model 4 was used for simple mediation analysis and model 6 was used for the multiple steps mediation analysis. The Hayes’ Process analyses were performed with 5,000 Bootstraps.

Results

Participants

In total 409 of the invited respondents (42.6%) returned a completed questionnaire. The mean age was 68.65 years ($SD = 6.60$). Males accounted for 54.0% of the participants. The reasons for non-participation ($n = 514$; 53.6%) included: lack of interest (29.8%); unreachable on registered postal address/telephone number (7.0%); health problems (10.1%); private problems (2.5%). Over four percent (4.1%) had deceased. Almost half of the non-respondents (46.5%) did not provide a reason for non-participation.

Older adult identification: The mean score was 4.18 ($SD = .86$). The majority of study participants (85.8%) identified themselves as an older adult (score > 3). A minority, 6.6%, rejected identifying themselves as an older adult (score < 3).

Older adult descriptive norms: The mean score was 4.57 ($SD = 1.62$). Half of the participants (50.9%) perceived that a minority of the ‘55-years-old-or-older adults’ in society

(score < 5) exercise, whereas almost thirty percent of the participants (28.1%) perceived that the majority of ‘55-years-old-or-older adults’ in society (score > 5) exercise.

Older adult injunctive norms: The mean score was 4.36 (SD = .82). The majority of the participants (85.6%) reported that ‘55-years-old-or-older adults’ should exercise (score > 3), whereas 3.4% reported that ‘55-years-old-or-older adults’ should not exercise (score < 3).

Older adult prototype norms: The mean score was 3.14 (SD = 1.46). The majority of the participants (64.8%) perceived that exercising is prototypical for adults younger than 55 years old (score < 4), whereas thirteen percent of the participants perceived exercise as prototypical for ‘55-years-old-or-older adults’ (score > 4).

Basic Needs Satisfaction: The mean score for BNS was 3.26 (SD = 1.04). This means that the average BNS experienced among the participants was moderate to high.

Autonomous motivation: The mean RAI score was 14.66 (SD = 6.08). This means that on average older adults did not have a high autonomous motivation or a high controlled motivation. However, this average score does show a weak tendency towards a more controlled motivation among older adults.

Exercise participation: The mean GLTEQ total score was 9.99 (SD = 12.33). Over 65% of the study participants reported to participate in exercise (GLTEQ > 0). This indicates that the participants, in mean, involved in exercise to the equivalent of two sessions of moderate-intensity exercise (of at least 20 continuous minutes) during a normal week.

The Pearson correlations are presented in Table 1. The Hierarchical Multiple Linear Regression of older adult identification, the older adult norms, and the products of older adult identification and these norms on BNS (Table 2) revealed that identification explained 4% of BNS (Model Step 1). Identification and the norms together (Model Step 2) explained 26% of BNS, with a weaker association between identification and BNS. Adding the product-

interactions of identification and the norms (Model Step 3) did not significantly change the explained variance of BNS.

Hayes’ Process analysis revealed that the older adult norms explained 26% of autonomous motivation (Table 3 - Total). All norms were positively associated with autonomous motivation (Table 3 – Total). BNS and injunctive norm explained autonomous motivation directly (Table 3 – Direct). All older adult norms and identification explained autonomous motivation (RAI) indirectly (Table 3 – Indirect).

Older adult identification and the older adult norms together predicted 6% of exercise participation (Table 4 – Total), whereas older adult identification, older adult norms, and exercise motivation, together explained 20% of exercise participation (Table 4 – Direct). Indirectly, all three norms were associated with exercise participation (Table 4 – Total Indirect) through the indirect ‘autonomous motivation’ pathways (BNS-Indirect, BNS-RAI-Indirect, RAI-indirect) except for older adult prototype norms which was not significantly associated with exercise participation in the RAI-indirect pathway.

Discussion

The aim of this study was to study the association among older adults between their autonomous motivation for exercising, based on SDT, and their perceived social identity norms, based on the SIA. More specifically, we examined the assumption that the perceptions that older adults have of the exercise norms for their social identity group would explain their experienced BNS and autonomous motivation. We also tested whether this association would be more positive the more respondents identified themselves as an older adult. Moreover, we tested whether the perceived social identity norms predicted older adults’ exercise participation.

Respondents reported to experience more BNS when they identified themselves more strongly as an older adult and when they perceived more positive older adult norms for exercising. The injunctive norm was moderately strongly associated with BNS, whereas the descriptive norm and the prototype norm were weakly associated with BNS. These findings confirm Hypothesis 1a. However, contrary to our expectations (Hypothesis 1b), identification as an older adult did not moderate the strength of the associations of the older adult norms with BNS: The product-interactions of identification and the norms did not explain BNS. However, in explaining BNS, identification as an older adult and the older adult norms jointly explained 24% of autonomous exercise motivation. This confirms our Hypothesis 2. Furthermore, hypothesis 3 was partially confirmed. The older adult norms predicted exercise participation in explaining autonomous motivation to exercise (BNS and RAI), but only the associations of the injunctive norm were sufficiently strong to explain a meaningful part of exercise participation.

Although perceived older adult norms and more autonomous motivation are significantly associated with more exercise participation, this association is much weaker. This weaker association could be explained by the fact that exercise participation depends on various other factors. For example, availability of exercise groups in the near area and / or financial resources could be examples of resources that might impact actual exercise participation, even though a person identifies as an older adult, values these social identity norms, and is autonomously motivated to exercise. Moreover, SDT assumes that more belongingness (part of BNS) has a positive influence on exercise participation. However, social belongingness could also be experienced as a kind of peer pressure to behave in a certain way. Such pressure might not be experienced as pleasant and could lead to controlled forms of motivation, which could actually negatively affect exercise participation.

Our findings seem to disconfirm the proposed moderating role of self-identification in terms of a social identity in the associations between this social identity’s norms and autonomous motivation. It suggests that the extent to which individuals identify themselves in terms of a social identity does not determine the extent to which they internalize this (social) identity’s norms as their personal norms, and therein does not determine their autonomous motivation to behave accordingly. In other words, it suggests that it does not matter to what extent individuals identify themselves in terms of a social identity or not, they will be autonomously motivated to behave according to the social identity norms.

However, the lack of a moderating effect of self-identification could also be caused by the fact that the majority of the study participants (85.8%) identified themselves as an older adult. Only a minority of the study participants did not identify (7.8%), or distinctly rejected identifying themselves as an older adult (6.6%). According to our proposed integration of SIA and SDT, only the study participants who did not define, or who (distinctly) rejected defining themselves as an older adult were expected not to internalize the older adult (social) identity norms for exercising as their own. Only among these study participants, the perceptions of the older adult (social) identity norms could be expected to be not or negatively associated with the autonomous motivation for exercising. Unfortunately, in our study the number of these participants was too small to perform subgroup analyses. Therefore, future studies should focus on including this specific group of older adults in their study.

The perception of the norm that ‘older adults should exercise’ (injunctive norm) did not only indirectly explain the experienced autonomous motivation by accounting for the experienced basic needs satisfaction in (i.e., self-intrinsic appreciation of) exercising, but also explained this volition to exercise directly. This could be because this norm potentially explains a part of their self-intrinsic appreciation of exercising that is not included in the concept of basic needs satisfaction. For example, their personal attitude towards exercising is not included.

It is possible that the injunctive norm directly predicts autonomous motivation in explaining a part of the self-intrinsic appreciation of exercising that is unaccounted for by basic needs satisfaction.

Implications

It has been repeatedly established that the majority of older adults do not sufficiently engage in physical activity to benefit their health, functioning and well-being (Kruger, Carlson, & Buchner, 2007; Sjöström, Oja, Hagströmer, Smith, & Bauman, 2006). Moreover, because exercise participation decreases with increasing age (Shaw, Liang, Krause, Gallant, & McGeever, 2010), older adults are the age group in society that is the least involved in exercise (Van Tuyckom & Scheerder, 2010). These findings suggest that engaging in sufficient levels of physical activity does not constitute an accepted social norm among older adults.

By contrast, the findings of the present study revealed that the majority of older adults agreed that adults over 55 should exercise sufficiently, even though these older adults also agreed that most individuals over 55 do not exercise sufficiently. In addition, the results of the current study showed that exercise motivation was partially explained by their perception of the injunctive exercise norm for older adults. Taken together, these findings thus indicate that older adults who perceive themselves as an older adult are more autonomously motivated to exercise because exercising is in line with the perceived norms for their age group. For daily practice, it can thus be recommended to continue promoting the injunctive exercise norm for older adults. For example, the television-commercials and advertisements should not only display active older adults, but also give voice to older adults underlying the norm that members of their group should be(come) active.

Limitations

A first limitation of this study resides in the definition of older adult as a ‘55-years-old-or-older adult’. In various countries the age for retirement is set at 65, which is also the case in Belgium. However, it is possible to retire at a much lower age. For that reason the involved social organization for older adults has set their criterion of older age at 55 years. As this organization constitutes the largest network of older adults in Belgium, it was decided to take over their definition of older adults.

A second limitation is that all study participants were member of a social organization for older adults. This social organization provides social exercise activities to its members. Therefore, we cannot rule out that, compared to older adults who are not a member of such a social organization the participants in our study differed in their perceptions of older adult (social) identity norms for exercising, and/or in their autonomous motivation for exercising. Consequently, the observed associations between the perceived older adult (social) identity (or age) norms and autonomous exercise motivation cannot be generalized to the general older adult population.

A third limitation is that we used a modified version of the social identification questionnaire and that we developed our own questionnaire to measure the perceived exercise norms for older adults. However, it should be pointed out that the modification of the identification questionnaire did not affect the internal consistency and that the norms questionnaire was set up in line with recommendations for measuring social norms and. We have also shortened the BNS questionnaire by deleting a few questions concerning constructs that were already covered by several other questions in order to keep the questionnaire manageable for participants. This shortened BNS questionnaire showed similar psychometric properties compared to the original version. Nevertheless, for further longitudinal studies we recommend to test the reliability of these questionnaires. A fourth limitation of our study is the

lack of an objective measurement for the level of physical activity. It is known that subjective measurements tend to overestimate the level of physical activity, while objective measurements tend to underestimate the level of physical activity. It is therefore recommended to include both types of measurements.

A fifth limitation is the cross-sectional design of this study. In order to allow for stronger indications of causality, this study should be repeated over time by means of follow-up measurements during a longitudinal study. Only such design could provide us strong conclusions concerning causality between older adults identification, autonomous motivation and level of physical activity.

Finally, the sample size was not determined based on the number of instruments that was used. Consequently, it could be that the study was somewhat underpowered.

Conclusion

Older adults who perceive themselves as an older adult are more autonomously motivated to exercise in line with their perceptions of the older adult age norms for exercise involvement.

Furthermore, more perceived older adult norms and more autonomous motivation are also significantly associated with more exercise participation, but this association is weak. This indicates that the last phase to actual exercise participation is more complex and needs further investigation.

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Figure 1. Hypothesized Associations of Older Adult Exercise Norms with Exercise Basic Needs Satisfaction (BNS) (Hypothesis/Model 1), Autonomous motivation (RAI) (Hypothesis/Model 2), and Participation (Hypothesis/Model 3), Controlled for the Moderation by Older Adult Identification.

Table 1: Pearson Correlations of Demographics, Older Adult Identification, Older Adult Norms, Exercise Motivation, and Exercise Participation

	1a	1b	2	3a	3b	3c	4a	4b	5
1. Demographics									
a. Age		.04	.02	-.05	.07	.06	-.09	-.03	-.15**
b. Gender ^o			.00	-.02	.03	-.01	.15**	.05	.14**
2. Older Adult Identification				.09	.19***	.06	.21**	.15**	.09
3. Older Adult Norms									
a. Descriptive					.25***	.29***	.30***	.29***	.13**
b. Injunctive						.14**	.44***	.43***	.21***
c. Prototype							.25***	.20***	.11*
4. Exercise Motivation									
a. Basic Needs Satisfaction (BNS)								.82***	.44***
b. Autonomous motivation (RAI)									.41***
5. Exercise Participation									

* $p < .05$, ** $p < .01$, *** $p < .001$, ^oMale

Table 2: *Model 1. Hierarchical Multiple Linear Regression Model of Older Adult Identification and Norms on Basic Needs Satisfaction (BNS).*

Model	BNS								
	Model Step 1			Model Step 2			Model Step 3		
	β	B	t	β	B	t	β	B	t
Factors									
Older Adult Identification	.21	.25	4.22***	.12	.14	2.66**	.12	.14	2.54*
Older Adult Norms									
Descriptive				.16	.10	3.40**	.15	.10	3.35**
Injunctive				.36	.45	7.99***	.36	.45	7.93***
Prototype				.15	.11	3.31**	.15	.10	3.27**
Older Adult Identification $\times$ Norms									
Descriptive							.02	.01	.31
Injunctive							-.06	-.07	-1.21
Prototype							.06	.05	1.24
F			17.82***			36.11***			21.05***
R^2			.042			.263			.269
ΔR^2						.221***			.005

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 3: Model 2. Mediation Process Model of Older Adult Identification and Older Adult Norms on Autonomous motivation (RAI): Direct, Basic Needs Satisfaction (BNS)-Indirect, and Total Associations.

Model 2	RAI									
	Direct			BNS-Indirect				Total		
	β	B	<i>t</i>	β	B	95% CI(B)	Sobel <i>z</i>	β	B	<i>t</i>
Mediator										
BNS	.77	4.53	23.29***							
Factors										
Older Adult Identification	-.05	-.36	-1.66	.09	.63	[.14, 1.14]*	2.53*	.04	.27	.84
Older Adult Norms										
Descriptive	.05	.19	1.64	.12	.45	[.18, .71]*	3.31**	.17	.64	3.63***
Injunctive	.09	.69	2.89**	.28	2.04	[1.53, 2.58]*	7.50***	.37	2.73	8.04***
Prototype	-.02	-.07	-.57	.12	.47	[.18, .77]*	3.24**	.10	.40	2.10*
Older Adult Identification × Norms										
Descriptive	-.02	-.10	-.70	.01	.05	[-.27, .38]	.31	-.01	-.05	-.22
Injunctive	-.03	-.22	-.91	-.04	-.33	[-.87, .30]	-1.20	-.07	-.55	-1.51
Prototype	-.04	-.19	-1.30	.04	.21	[-.12, .56]	1.23	.00	.02	.09
<i>F</i>		105.24***							18.22***	
<i>R</i> ²		.678							.241	

* $p < .05$, ** $p < .01$, *** $p < .001$

Tab Model 3. Multiple Mediation Process Model of Older Adult Identification and Older Adult Norms on Exercise Participation: Direct, Basic Needs Satisfaction (BNS)-Indirect, Autonomous motivation (RAI)-Indirect, BNS→RAI-Indirect, and Total Associations.**le 4:**

Model 3	Participation						
	Direct			BNS-Indirect		RAI-Indirect	
	β	B	t	B	95% CI (B)	B	95% CI (B)
Mediator							
BNS	.31	3.6	3.81***				
		3					
RAI	.16	.33	2.08*				
Factors							
Older Adult Identification	.01	.14	.20	.50	[.14, 1.09]*	-.12	[-.38, .00]
Older Adult Norms							
Descriptive	-.01	-.08	-.22	.36	[.13, .68]*	.06	[.00, .21]*
Injunctive	.01	.09	.12	1.63	[.92, 2.60]*	.23	[.03, .58]*
Prototype	.00	-.01	-.04	.38	[.15, .72]*	-.02	[-.16, .07]
Older Adult Identification ×							
Norms							
Descriptive	-.01	-.07	-.16	.04	[-.21, .33]	-.03	[-.16, .05]
Injunctive	.00	.04	.05	-.27	[-.78, .18]	-.07	[-.32, .06]
Prototype	.04	.43	.92	.17	[-.08, .50]	-.06	[-.24, .02]
F			11.39***				
R^2			.204				

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4: (continued) Model 3. Multiple Mediation Process Model of Older Adult Identification and Older Adult Norms on Exercise Participation: Direct, Basic Needs Satisfaction (BNS)-Indirect, Autonomous motivation (RAI)-Indirect, BNS→RAI-Indirect, and Total Associations.

Model 3	Participation							
	BNS→RAI-Indirect		Total Indirect			Total		
	B	95% CI (B)	β	B	95% CI (B)	β	B	t
Mediators								
BNS								
RAI								
Factors								
Older Adult Identification	.21	[.03, .59]*	.04	.59	[.05, 1.28]*	.05	.73	1.00
Older Adult Norms								
Descriptive	.15	[.03, .35]*	.07	.57	[.25, .94]*	.06	.49	1.23
Injunctive	.68	[.14, 1.35]*	.17	2.5	[1.83, 3.48]*	.18	2.6	3.43***
				4			3	
Prototype	.16	[.03, .39]*	.06	.51	[.17, .92]*	.06	.50	1.16
Older Adult Identification ×								
Norms								
Descriptive	.02	[-.09, .16]	.00	.02	[-.36, .42]	-.01	-.04	-.09
Injunctive	-.11	[-.45, .05]	-.03	-.45	[-1.16, .27]	-.03	-.41	-.50
Prototype	.07	[-.02, .27]	.02	.17	[-.22, .61]	.06	.60	1.20
F							3.63***	
R^2							.060	

* $p < .05$, ** $p < .01$, *** $p < .001$