

A systematic review and meta-analysis on basic psychological need satisfaction, motivation, and well-being in later life: Contributions of self-determination theory

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Abstract: As the population ages, it is important to understand the factors that contribute to well-being in the elderly. The purpose of this study is to perform a systematic review and meta-analysis of research on well-being among elderly people conducted particularly within the framework of self-determination theory and, more precisely, to study the relationships among basic psychological need satisfaction, motivation, and well-being. Therefore, a systematic search of the literature was conducted using the databases PsycINFO, PsycARTICLES, Academic Onefile, MEDLINE, Science Direct, and ERIC to find studies published in English and French. China National Knowledge Infrastructure (CNKI) was used to find studies published in Chinese. Ultimately, 23 studies (mainly from the United States, Canada, and Europe; no studies published in China were found) in the field of aging were used for the systematic analysis, 17 of which were used for the meta-analysis. The results reported in these publications are relatively congruent with the idea that basic psychological need satisfaction and motivation (autonomous types) are positively associated with positive indicators of well-being (meaning in life, life satisfaction, positive affect, self-esteem, etc.) and negatively associated with negative indicators of well-being (depression, apathy, etc.).

Keywords: basic psychological need satisfaction; elderly people; motivation; self-determination theory; well-being

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Globally, the population aged 60 or older is growing faster than all younger age groups. As fertility declines and life expectancy increases, the proportion of the population above a certain age also increases. This phenomenon, known as *population aging*, is occurring throughout the world. According to the results of the 2017 Revision of World Population Prospects published by the United Nations, the number of people aged 60 or older is currently estimated to be 962 million worldwide, comprising 13% of the global population. Furthermore, by 2050, the global population of older people is projected to be 2.1 billion, or 21% of the world population (United Nations, 2017). As the population ages, it is important to understand the factors that contribute to well-being in the elderly.

The concept of “well-being” refers to optimal psychological functioning and experience (Ryan & Deci, 2001). Two distinct approaches have been used to explore this term: the hedonic approach and the eudaemonic one. The first focuses on happiness or pleasure in order to define well-being in terms of experience—pleasure attainment and pain avoidance (Kahneman, Diener, & Schwarz, 1999)—while the second focuses on meaning and self-realization so as to define *well-being* as the degree to which a person is fully functioning. Based on the hedonic approach's definition, current empirical hedonic psychology has used the assessment of subjective well-being to evaluate well-being through three components, namely life satisfaction, positive affect, and negative affect (Diener & Lucas, 1999). In order to distinguish it from the subjective well-being based on

the eudaemonic approach, Ryff and Keyes (1995) came up with the term “psychological well-being” for measuring well-being while referring to six distinct aspects of human actualization: autonomy, personal growth, self-acceptance, life purpose, mastery, and positive relatedness.

Self-determination theory (SDT; Ryan & Deci, 2000) is one of the most important perspectives based on the eudaemonic approach, which states that self-realization is a central definitional aspect of well-being and focuses mainly on factors that can contribute to well-being. Specifically, the SDT approach largely agrees with the eudaemonic approach concerning the content of being eudaemonic: mainly, being autonomous, competent, and related to others. However, SDT considers that these elements are the principal factors that typically promote well-being (e.g., life satisfaction and psychological health), whereas Ryff’s eudaemonic approach uses them to define *well-being* (Ryan & Deci, 2001).

The current paper is the first review to summarize the results of international studies on well-being in later life based on the framework of SDT. The review first introduces SDT and six mini-theories, two of which—basic psychological needs theory and organismic integration theory—are related to this study’s topic and are introduced in detail. The second part of this review provides a systematic review of 23 empirical studies of well-being among elderly people conducted within the framework of the SDT published in English or French. Whenever possible, a meta-analysis was conducted to quantify findings from the 17 previous studies. In the third section, we discuss the limitations of the current research and propose the relevance of and future perspectives for this important field of research.

Self-determination theory

SDT is a macro-theory that describes human behavior and personality development (Ryan, Connell, & Deci, 1985; Ryan & Deci, 2000, 2017), and was proposed by US psychologists Deci and Ryan (Deci & Ryan, 1985a, 1985b). The theory principally explores the energization and direction of behavior, as well as what forces facilitate, divert, or thwart that natural energy and direction. Energy in SDT is fundamentally a matter of three basic psychological needs: autonomy, competence, and relatedness. According to SDT, these needs are innate, not acquired, and they are

functionally important to all human beings across cultural, sex, life span, and life domain (Chen et al., 2015; Hahn & Oishi, 2006; Milyavskaya et al., 2009). More precisely, an organism remains healthy due to the fulfillment of its basic psychological needs whereas, inversely, people become ill when their needs are frustrated. Whether an individual’s psychological needs are satisfied or frustrated is determined through their interaction with the environment (Ryan & Deci, 2001, 2017). In short, SDT explores all aspects of an organism’s needs and the processes and structures that relate those needs to behavior. SDT provides a theoretical framework for researchers and practitioners who are interested in promoting human functioning and wellness and, thus, it has been applied in general and specific areas, both in real social contexts and virtual worlds (R. D. Liu, Shen, Xu, & Gao, 2014; Rigby & Ryan, 2011).

Formally, SDT supports six mini-theories:

1. Cognition evaluation theory (CET; Deci & Ryan, 1975, 1980; Ryan, 1982; Ryan, Mims, & Koestner, 1983) mainly discusses the impact of external events (including incentives, set periods, competitions, and goals) on the supporting and thwarting of intrinsic motivation, and this mini-theory is often used in a studying or working environment (Mandigo & Holt, 2000; Matosic, Cox, & Amorose, 2014).
2. Organismic integration theory (OIT; Ryan & Deci, 2000) is concerned with various types of motivation, as well as their specific antecedents and effects on behavior quality and psychological well-being (Altintas & Guerrien, 2014; Philippe & Vallerand, 2008; Stephan, Boiché, & Le Scanff, 2010).
3. Causality orientations theory (COT; Deci & Ryan, 1985b) focuses on individual differences in motivation style and refers to the degree to which people tend to orient toward the external environment or toward goal attainment (Rose, Parfitt, & Williams, 2005; Soenens, Berzonsky, Vansteenkiste, Beyers, & Goossens, 2005).
4. Basic psychological needs theory (BPNT; Ryan & Deci, 2001) mainly considers the three innate psychological needs—autonomy, competence, and relatedness—and addresses the relationship of basic psychological need satisfaction to well-being (Mackenzie, Karaolas, & Starzyk, 2017; Souesme, Martinent, & Ferrand, 2016).
5. Goal contents theory (GCT; Deci & Ryan, 2000; Sheldon, Ryan, Deci, & Kasser, 2004) is based on two categories of goal attainment: extrinsic goals (e.g., pursuit of wealth, fame, and image) and intrinsic goals

(e.g., pursuit of personal growth, relationships, and contribution to community), and their relationship to individual behavior and wellness. This mini-theory is often applied in the contexts of work and the classroom (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004; Vansteenkiste, Timmermans, Lens, Soenens, & Van den Broeck, 2008).

6. Relationships motivation theory (RMT; Deci & Ryan, 2014) concerns the qualities of close relationships and their consequences (Hadden, Rodriguez, Knee, & Porter, 2015; Weinstein, Hodgins, & Ryan, 2010).

In this article, we will focus on BPNT and OIT, because these two mini-theories describe the variables that are considered as determinants of well-being in the SDT framework (Ryan & Deci, 2000, 2017), and because they constitute the theoretical foundations of the studies concerning well-being in the elderly. BPNT describes the relationship between basic psychological needs—satisfaction and frustration—and psychological well-being and ill-being at the organismal level (Deci & Ryan, 1985a; Ryan, Bernstein, & Brown, 2010). According to the previous studies' results, the effect of these relationships is largely mediated by autonomous motivation (e.g., Altintas, De Benedetto, & Gallouj, 2017; Philippe & Vallerand, 2008). OIT describes the benefits of basic psychological needs: it suggests that satisfaction assists in internalizing an extrinsic motivation by transforming it into an autonomous motivation. The theory further outlines the effect of autonomous motivation on people's high quality of behavior, as well as the resulting positive psychological consequences (Deci & Ryan, 1985a; Kasser & Ryan, 1999; Ryan et al., 1985; Ryan & Deci, 2000).

Organismic integration theory

OIT mainly describes motivation as lying on a continuum and explores the impact of different types of motivational regulation on behavior and mental health (Ryan & Deci, 2000).

Depending on the degree of “self-determination,” which refers to the experience of freedom in initiating one's behavior, OIT considers motivation on a continuum from amotivation (AM) to extrinsic motivation (EM) to intrinsic motivation (IM; see Figure 1). IM, which corresponds to intrinsic regulation, means that activities are performed with pleasure, interest, or satisfaction (Vallerand &

Grouzet, 2001). For example, an older person may participate in a chess club because he/she loves board games.

EM means that activities are performed in an instrumental manner. According to the degree of self-determination, there are four forms of EM that correspond to four types of motivational regulation:

1. Integrated motivation/integrated regulation corresponds to engagement in an activity that is considered important and coherent with the needs, values, and goals of the individual. The individual's behavior is completely internalized from external rules; thus, integrated motivation/integrated regulation is similar to IM, but the behavior itself is instrumental. For example, an old man may insist on participating in a chess club because he is an expert in this game and it has always been important in his life.
2. Identified motivation/identified regulation refers to cases in which people accept and fully endorse the importance of an activity (Ryan & Deci, 2003). For example, an elderly person may participate in a chess club because he/she finds that this activity is important for maintaining his/her cognitive ability.
3. Introjected motivation/introjected regulation of behavior refers to cases in which an individual performs an activity due to internal pressures. For example, an older person may participate in a chess club to please his/her family.
4. External motivation/external regulation refers to when an individual performing an activity is motivated by the desire to obtain an external reward or to avoid punishment. For example, an older person may participate in a chess club to obtain a material reward, such as a book, offered by the club.

Integrated motivation/integrated regulation and identified motivation/identified regulation are forms of autonomous EM, whereas introjected motivation/introjected regulation and external motivation/external regulation are classified as forms of controlled EM (Deci & Ryan, 2008).

AM, which corresponds to non-regulation, refers to the lack or absence of IM or EM. In other words, individuals who exhibit AM do not perceive the contingencies between their actions and their consequences. For instance, in a nursing home, an elderly person may participate in a chess club but may not be interested in this activity and may not understand the benefits of participating in this activity.

According to OIT, the degree to which people's behavior is regulated through more autonomous means will correlate

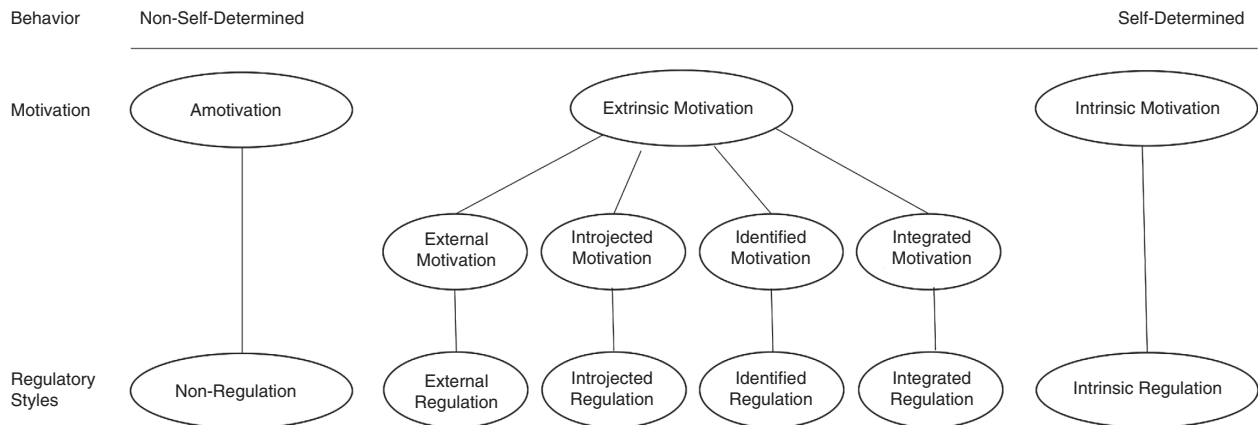


Figure 1. Self-determination continuum showing types of motivation and their regulatory styles (adapted from Ryan & Deci, 2000).

with more positive experiences and greater psychological health and well-being (Ryan & Deci, 2000, 2017); and satisfaction of the three basic psychological needs is essential for autonomous motivation (Philippe & Vallerand, 2008; Ryan & Deci, 2017).

Basic psychological needs theory

BPNT is the core theory of SDT. It describes the three basic psychological needs and conceptualizes psychological needs satisfaction as providing innate psychological “nutriments” that are essential for ongoing psychological growth and well-being (Ryan & Deci, 2000). The three basic psychological needs were identified as the needs for autonomy, competence, and relatedness. The need for autonomy refers to the need for individual freedom to make decisions and to feel responsible for one’s own behavior (Deci & Ryan, 1985a). For example, in a nursing home, the need for autonomy could be satisfied if an elderly person personally chooses the clothes he/she wears rather than allowing the nursing staff to choose them. The need for competence refers to the individual’s feeling of effective control and of mastery over his/her social environment and outcomes (Deci & Ryan, 2002; Ryan & Deci, 2001). For example, the need for competence could be satisfied when a retired teacher continues to support school education. Finally, the need for relatedness is defined as an individual’s need to feel a secure sense of belonging and connection to others in his or her social environment (Deci & Ryan, 2002; Ryan & Deci, 2001). For example, the need for relatedness

could be satisfied by maintaining a close relationship with family and friends.

BPNT emphasizes the relationship between the social environment and the individual and implies that understanding well-being requires consideration of the fulfillment of basic psychological needs. More precisely, supported-autonomy environments, or environmental conditions that promote and facilitate an individual’s opportunity to self-initiate and to choose his/her own actions, can predict psychological needs satisfaction (Philippe & Vallerand, 2008; Sheldon & Krieger, 2007). The level of basic psychological needs satisfaction predicts organism well-being, such as increased positive affect (Hill & Howell, 2014), stronger emotional ties, greater life satisfaction (Kanat-Maymon, Antebi, & Zilcha-Mano, 2016), increased subjective vitality (Rahman, Hudson, Thøgersen-Ntoumani, & Doust, 2015; Sylvester et al., 2014), and less negative affect, depression, and anxiety (Hill & Howell, 2014; Kanat-Maymon et al., 2016; Rahman et al., 2015).

According to SDT, basic psychological need satisfaction facilitates more autonomous forms of motivation, which in turn yields greater wellness, whereas basic psychological need frustration promotes controlled motivation, which in turn decreases well-being. In line with SDT, we hypothesize that basic psychological need satisfaction and/or autonomous motivation would show positive relations with positive indicators of well-being (such as life satisfaction, adaptation, etc.), while presenting negative relations with negative indicators of well-being (such as depression, anxiety, etc.), whereas controlled motivation would indicate negative relations with positive indicators of well-being and

show positive relation with negative indicators of well-being. In the next section, we present 23 empirical studies of well-being in the field of aging within the framework of SDT.

Methods

With the continuous development and growth of SDT, this theory has been widely recognized and applied by researchers in many countries worldwide. Current research on well-being in later life within the framework of SDT is mainly concentrated in North America (Canada and the United States) and Europe; the main research topics are the impacts of needs satisfaction and autonomous motivation and their contribution to well-being as manifested by life satisfaction, vitality, adaptation, depression, and so forth.

Study search and selection

A systematic search of the literature was conducted using the databases PsycINFO, PsycARTICLES, Academic Onefile, MEDLINE, ScienceDirect, and ERIC to find articles published in English and French within the period from inception to November 2018. The following keywords were used: (a) <self-determination theory>; AND (b) <well-being> or <psychological adjustment> or

<meaning in life> or <self-esteem> or <life satisfaction> or <depression> or <perceived health> or <subjective health> or <affect states> or <vitality>; AND (c) <basic psychological needs satisfaction> or <need fulfillment> or <psychological needs> <autonomy> or <competence> or <relatedness>; OR (d) <motivation> or <self-determined motivation> or <autonomous motivation> location in the subject text. The search was limited to articles published in peer-reviewed journals.

A total of 232 articles were obtained during the first round of search (retrieval time for October 12, 2018, 2:46 p.m.). Four principal inclusion criteria were used to screen the identified studies. First, the study must have been conducted in the SDT framework. Second, the study must have used a validated measure for basic psychological need satisfaction/motivation and well-being. Third, the relationships among the three basic psychological needs/types of motivation and well-being (life satisfaction, vitality, depression, etc.) must have been reported using a statistical test. Finally, the participants must have been elderly (aged more than 50 years). Additional studies ($n = 4$) were identified from the reference lists. Eventually, 23 articles were selected for the systematic analysis and 17 of these were used for the meta-analysis (six studies were excluded for not providing the necessary data r ; see Figure 2).

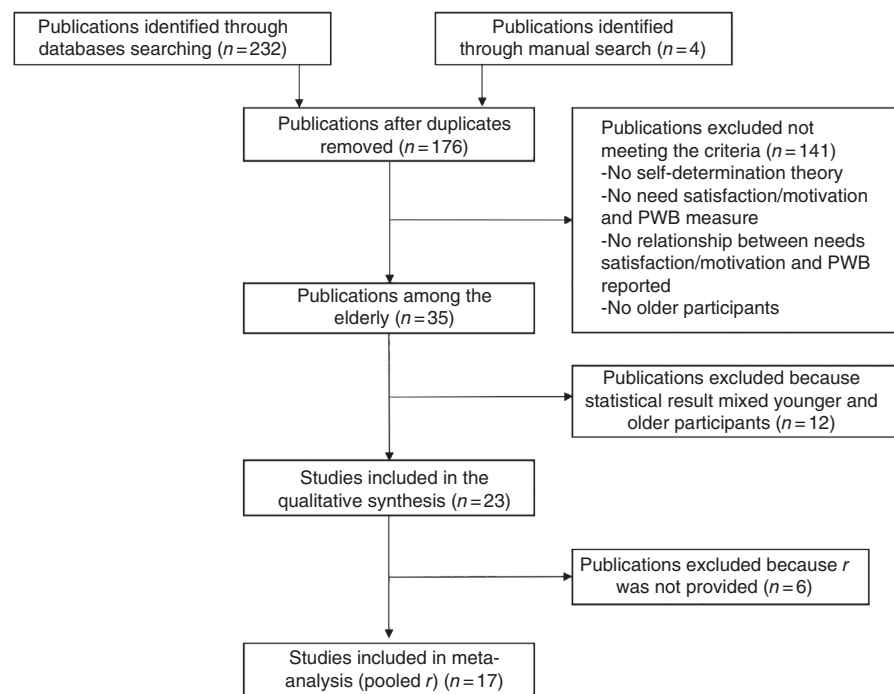


Figure 2. Study selection process. PWB = psychological well-being.

China National Knowledge Infrastructure (CNKI) was used to search for articles published in Chinese. The same keywords in Chinese were used with the same process (retrieval period from inception to 2018, retrieval time for October 13, 2018, 10:30 a.m.). Unfortunately, zero empirical studies on the well-being of elderly persons conducted within the framework of SDT have been published in Chinese to date.

Data extraction and synthesis

The following data were extracted from each article: publication language (English or French); type of study design (cross-sectional or longitudinal); country in which the study was conducted; living environment of the participants; needs satisfaction or motivation questionnaire used; methodology (self-report); and the relationship between needs satisfaction or autonomous motivation and indicators of well-being, such as life satisfaction, positive affect, and depression. The collected data are presented in Table 1 (representative studies illustrating the relationship between need satisfaction and well-being) and Table 2 (representative studies illustrating the relationship between motivation and well-being). All the reviewed articles are included in the list of references.

Meta-analysis procedure

In our study, the meta package in the R 3.3.5 package was used to compute the average-weighted mean correlation coefficients between the three basic psychological needs satisfaction/types of motivation and well-being. According to Abrami, Cohen, and d'Apollonia (1988), an r value of .10, .30, or .50 indicates a small, medium, or large effect, respectively. The heterogeneity of the correlation coefficients obtained was quantified using the Q statistic and the I^2 index. The Q statistic is used to evaluate whether the dispersion of the correlation coefficients is significant, while the index I^2 provides a measure of the homogeneity of the results reported through the studies (Borenstein, Hedges, Higgins, & Rothstein, 2011). When the p value is greater than .1, in the case of Q statistics, this means that the heterogeneity is small; in these cases the fixed effect model was used for the combination. Otherwise, the random effect model was used to compute (Corbière & Larivière, 2014). On the side of the I^2 index, it has been proposed that values of 25%, 50%, and 75% are associated, respectively, with a presence of weak, moderate, and strong heterogeneity (Higgins, Thompson, Deeks, & Altman, 2003).

Results

In this section, the findings of the 23 empirical studies are classified into two sets of results: Result 1, the findings on the contribution of need satisfaction to well-being among the elderly; and Result 2, the findings on the contribution of motivation to well-being among the elderly.

Result 1 will be presented first by a systematic review of results, in the text and in Table 1, followed by a meta-analytic result (Table 3), and finally followed by Table 4, which presents all the questionnaires used in the field of aging to measure need satisfaction. Result 2 will be presented first by a systematic review of results in the text and in Table 2, then followed by a meta-analytic result (Table 5), and finally followed by Table 6, which presents all the questionnaires used in the field of aging to measure motivation.

Result 1: Contribution of need satisfaction to well-being among the elderly

Systematic review results.

Among the 23 empirical studies included in this literature review (three articles studied both basic needs satisfaction and motivation), 14 studies focus on the relationship between basic psychological need satisfaction and well-being, as shown in Table 1. Of these 14 studies, ten were published in English and two were published in French. With respect to the origins of these articles, three studies were from France, three were from the Netherlands, and the remaining eight were from other countries, including the United States ($n = 2$), Norway ($n = 2$), Canada ($n = 2$), Germany ($n = 1$), and Malaysia ($n = 1$). Concerning the living environment of the subjects, five studies were conducted in nursing homes, six took place in communities, two were conducted in hospitals, and one was conducted at an urban private residential service. Concerning the type of study design used, 10 studies used a cross-sectional design, and the remaining four used a longitudinal design. Fourteen studies used need satisfaction questionnaires: the Basic Need Satisfaction in Life Scale (Gagné, 2003), the Perception of Need Fulfillment in the Caring Relationship (La Guardia, Ryan, Couchman, & Deci, 2000), the Relatedness Need Satisfaction Modified Medical Outcomes Study Social Support Survey (Sherbourne & Stewart, 1991), Autonomy Satisfaction (Standage, Duda, & Ntoumanis, 2003), the Competence subscale of the Intrinsic Motivation

Table 1
Representative Studies Illustrating the Relationship Between Need Satisfaction and Well-Being

Authors, year (country)	Publication language, study design	Participants (living situation)	Need satisfaction measures	Well-being indicators	Representative findings
Abolfathi Momtaz, Ibrahim, & Hamid, 2014 (Malaysia)	English, cross-sectional	N = 2,552, age range: 60–103 years, $M_{age} = 69.09$ (home)	Relatedness need satisfaction, modified with the Medical Outcomes Study Social Support Survey (Sherbourne & Stewart, 1991; self-report)	Perceived health	Both receiving support and giving support were associated with perceived health, but giving, rather than receiving, was the stronger predictor of perceived health ($\beta = .05$, $p < .05$; $\beta = .12$, $p < .001$).
Custers et al., 2010 (Netherlands)	English, cross-sectional	N = 88, age range: 50–97 years, $M_{age} = 78.6$ (nursing homes)	Needs satisfaction in caring relationship (La Guardia, Ryan, Couchman, & Deci, 2000); Need fulfillment in general, Basic Need Satisfaction in Life Scale (Gagné, 2003)	Life satisfaction; depression	Need satisfaction in general was positively associated with life satisfaction ($r = .3$, $p < .01$), and negatively associated with depression ($r = -.053$, $p < .01$). Need satisfaction in caring relationship was positively correlated with life satisfaction ($r = .30$, $p < .01$) and negatively correlated with depression ($r = -.40$, $p < .01$). Need satisfaction in general has a mediation effect between need satisfaction in caring relationship and depression.
Custers, Westerhof, Kuin, Grijssen, and Riksen-Walraven, 2012 (Netherlands)	English, longitudinal	N = 75, age range: 55–93 years, $M_{age} = 79.9$ (nursing homes)	Basic Need Satisfaction in Life Scale (Gagné, 2003; self-report)	Subjective health	The fulfillment of relatedness was negatively related to age and subjective health ($r = -.42$, $p < .05$; $r = -.49$, $p < .01$).
Custers, Westerhof, Kuin, Grijssen, and Riksen-Walraven, 2013 (Netherlands)	English, longitudinal	N = 36, age range: 55–93 years, M = 80 years (nursing homes)	Basic Need Satisfaction in Life Scale (Gagné, 2003; self-report)	Satisfaction With Life Scale (Pavot & Diener, 1993; Steverink, Westerhof, Bode, & Dittmann-Kohli, 2001); Geriatric Depression Scale (Jongenelis et al., 2007)	Need fulfillment was positively related with life satisfaction ($r = .49$, $p < .01$), but negatively correlated with depression ($r = -.56$, $p < .01$).
Ferrand, Martinent, & Durmaz, 2014 (France)	French, cross-sectional	N = 100 (80 women/20 men), age range: 80–96 years, M = 86.7 years (urban private residential service)	Autonomy (Standage, Duda, & Ntoumanis, 2003); Competence: Intrinsic Motivation Inventory (McAuley, Duncan, & Tammen, 1989);	Ryff's Psychological Well-Being Scale (Lapierre & Desrochers, 1997); Geriatric Depression Scale (Cheng et al., 2010)	The three need satisfaction measures (autonomy, competence, relatedness) were positively correlated with purpose in life ($r = .26$, $p < .01$; $r = .26$, $p < .01$;

Table 1
Continued

Authors, year (country)	Publication language, study design	Participants (living situation)	Need satisfaction measures	Well-being indicators	Representative findings
Ferrand, Martinent, & Charry, 2015 (France)	French, cross-sectional	$N = 100$ (71 women, 29 men), aged: ≥ 65 years, $M_{age} = 84.04$ years (hospital center)	Relatedness: 10-item Need for Relatedness Scale (Richer & Vallerand, 1998; self-report) Autonomy: (Standage et al., 2003) Competence: Intrinsic Motivation Inventory (McAuley et al., 1989) Relatedness: 10-item Need for Relatedness Scale (Richer & Vallerand, 1998; self-report)	15-item Geriatric Depression Scale (Sheikh & Yesavage, 1986); Apathy Scale (Marin, Biedrzycki, & Finnciogiullari, 1991)	$r = .26, p < .01$, and competence need satisfaction was positively correlated with personal growth ($r = .20, p < .05$). Relatedness need satisfaction positively predicted personal growth ($\beta = .20, p < .05$). There is no significant correlation between the satisfaction of the three needs and depressive feelings. Autonomy satisfaction was negatively associated with depressive symptoms and apathy ($r = -.23, p < .05$; $r = -.33, p < .01$). Competence satisfaction was negatively associated with depressive symptoms and apathy ($r = -.41, p < .01$; $r = -.51, p < .01$). Competence satisfaction negatively predicted depressive symptoms (except high-high) and apathy. In all 10 studies, needs satisfaction was positively correlated with positive affect. Autonomy and competence satisfaction positively predicted positive affect ($\beta = .21, p < .01$; $\beta = .13, p < .05$). Relatedness satisfaction negatively predicted negative affect ($\beta = .16, p < .05$). Culture led to significant differences in the contribution of need satisfaction to affect in the United States and Korea.
Hahn & Oishi, 2006 (United States)	English, cross-sectional	Old Americans $N = 49$, $M_{age} = 73.7$ Young Americans $N = 55$, $M_{age} = 22.3$ Old Koreans $N = 47$, $M_{age} = 69.7$ Young Koreans $N = 50$, $M_{age} = 21.7$ (home)	Need-Satisfaction Questionnaire (Sheldon, Elliott, Kim, & Kasser, 2001; self-report)	Positive Affect and Negative Affect Schedule (Watson, Tellegen, & Clark, 1988)	

Table 1
Continued

Authors, year (country)	Publication language, study design	Participants (living situation)	Need satisfaction measures	Well-being indicators	Representative findings
Kanning & Hansen, 2016 (Germany)	English, cross-sectional	$N = 68$, age range: 50–70 years (home)	Relative Autonomy Index (Sheldon & Elliot, 1999); Competence Satisfaction (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000); Relatedness, Basic Need Satisfaction in Life Scale (Gagné, 2003)	Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985; Pavot & Diener, 1993); Affect States: Short Mood Scale (Wilhelm & Schoebi, 2007)	Age led to significant differences in the levels of relatedness. Affect States (Calmness) was significantly and positively predicted by the three psychological needs (standardized effect (SE) for autonomy = 0.01; SE for competence = 0.08; SE for being together = 0.14). Perceptions of autonomy support from family and friends, were associated with lower depression ($r = -.33$, $p < .05$) and increased well-being ($r = .39$, $p < .05$) and life satisfaction ($r = .57$, $p < .001$).
Kasser & Ryan, 1999 (United States)	English, cross-sectional	$N = 50$ (39 women/11 men), age range: 70–99 years, $M_{age} = 83$ years (nursing home)	Autonomy support staff, Health-Care Climate Questionnaire (Williams, & Grow, Freedman, Ryan, & Deci, 1996); autonomy support from friends/family; number and frequency of social contacts; quality of relatedness to friends/family; Relationship Quality Questionnaire (Dean, Kolody, Wood, & Ensel, 1989; self-report)	Anxiety, Depression, Well-being: Rand Health Insurance Questionnaire (RAND; Brook, Ware, Davis-Avery, et al., 1979); Subjective Vitality; Life Satisfaction Scale (Diener, Emmons, Larsen, & Griffin, 1985); Perceived health; Morality index;	Perceptions of autonomy support from staff, were associated with lower depression ($r = -.41$, $p < .01$) and increased well-being ($r = .39$, $p < .05$), vitality ($r = .47$, $p < .01$), and life satisfaction ($r = .41$, $p < .05$). Relatedness satisfaction was positively associated with positive well-being ($r = .40$, $p < .05$), perceived health ($r = .38$, $p < .05$) and vitality ($r = .31$, $p < .05$), but there was no significant correlation with anxiety, depression, or life satisfaction.
Mackenzie, Karaolas, & Starzyk, 2017 (Canada)	English, cross-sectional	$N = 66$, age range: 55–89 years, $M_{age} = 74$ years (home)	Basic Psychological Needs Scale (Gagné, 2003; self-report)	Purpose and growth, Satisfaction With Life Scale (Diener et al., 1985)	Need satisfaction was positively associated with purpose and growth ($r = .49$, $p < .01$), and life satisfaction ($r = .46$, $p < .01$).
Philippe & Vallerand, 2008 (Canada)	English, longitudinal	Time 1: $N = 126$, age range: 65–96 years,	Autonomy satisfaction (Reid et al., 1977; Wolk & Tellegen, 1976; self-report)	Psychological adjustment: BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961);	Perceived autonomy support was positively correlated with

Table 1
Continued

Authors, year (country)	Publication language, study design	Participants (living situation)	Need satisfaction measures	Well-being indicators	Representative findings
Solberg, Halvari, & Ommundsen, 2013 (Norway)	English, longitudinal	$M_{age} = 80.48$ years, Time 2: $N = 83$ (nursing homes)	Competence (Perceived Competence Scale; Williams & Deci, 1996; self-report)	Satisfaction With Life Scale (Diener et al., 1985); Meaning of Life Scale (Reker, Peacock, & Wong, 1987); Self-Esteem Scale (Rosenberg, 1965)	psychological adjustment ($r = .35, p < .01$).
Solberg, Hopkins, Ommundsen, & Halvari, 2012 (Norway)	English, longitudinal	$N = 118, M = 74.3$ years, Intervention group ($N = 85$), Control group ($N = 33$) (home) $N = 138, M_{age} = 74.2$ (home)	Basic Psychological Need Satisfaction in Exercise Scale (Vlachopoulos & Michailidou, 2006); Perceived autonomy support: Health-Care Climate Questionnaire (Williams et al., 1996)	Subjective Vitality Scale (Ryan & Frederick, 1997)	Change in perceived competence was correlated with change in vitality ($r = .23, p < .01$) Among older adults, only the change in need for competence had clear effects on change in vitality (standardized size [effect size] and 99% confidence limit = $.51 \pm .62$).
Souesme et al., 2016 (France)	English, cross-sectional	$N = 100$ (69 women/31 men), age range: 80–96 years, $M_{age} = 83.33$ years (hospital center)	Autonomy (Standage et al., 2003) Motivation Inventory (McAuley et al., 1989); Relatedness: 10-item Need for Relatedness Scale (Richer & Vallerand, 1998; self-report)	Depressive symptoms: 15-item Geriatric Depression Scale (Sheikh & Yesavage, 1986); apathy	Perceived autonomy support was positively correlated with satisfaction of three needs (autonomy, competence, relatedness; $r = .46, p < .01$; $r = .47, p < .01$; $r = .62, p < .01$). The satisfaction of three psychological needs (autonomy, competence, relatedness) was negatively correlated with depressive symptoms ($r = -.32, p < .01$; $r = -.50, p < .01$; $r = -.38, p < .01$) and apathy ($r = -.47, p < .01$; $r = -.59, p < .01$; $r = -.52, p < .01$).

Table 2
 Representative Studies Illustrating the Relationship Between Motivation and Well-Being

Authors (country)	Publication language, study design	Participants (living situation)	Motivation measure	Well-being indicators	Representative findings
Altintas & Guerrien, 2009 (France)	French, cross-sectional	$N = 40$ (31 women, 9 men), $M_{age} = 80.5$ years, non-depressive = 19, depressive = 21 (institution = 20, home = 20)	Elderly Motivation Scale (Vallerand & O'Connor, 1991; self-report)	Depression: Geriatric Depression Scale (Bourque, Blanchard, & Vézina, 1990)	Autonomous motivation (IM and ID) was negatively associated with depression ($r = -.42, p < .05$; $r = -.27, p < .01$). Controlled motivation (EX and AM) was positively associated with depression ($r = .50, p < .05$; $r = .41, p < .05$).
Altintas, Majchrzak, Leconte, & Guerrien, 2010 (France)	French, cross-sectional	$N = 77$ (62 women, 15 men), $M_{age} = 83.12$ years (nursing home)	Leisure Motivation Scale (Pelletier, Vallerand, Green-Demers, Blais, & Brière, 1996; self-report)	Elderly Residence Adjustment Scale (Castonguay & Ferron, 1999); Satisfaction With Life Scale (Diener et al., 1985)	Autonomous motivation (IM and ID) and Intro were positively associated with adaptation of the elderly to the nursing home ($r = .48, p < .01$; $r = .41, p < .01$; $r = .25, p < .05$). AM was negatively associated with adaptation ($r = -.40, p < .01$).
Altintas & Guerrien, 2014 (France)	French, cross-sectional	$N = 73$ (36 women, 37 men), $M_{age} = 74.21$ years (home)	Elderly Motivation Scale (Vallerand & O'Connor, 1991; self-report)	Life satisfaction (Blais, Vallerand, Pelletier, & Brière, 1989); meaning in life (Bouffard & Lapierre, 1997); Self-Esteem Scale (Vallières & Vallerand, 1990); Depression: Beck Depression Inventory (Beck et al., 1961)	IM was positively associated with life satisfaction ($r = .33, p < .05$) and a well-being index ($r = .28, p < .01$). ID was positively associated with a well-being index ($r = .34, p < .01$), life satisfaction ($r = .27, p < .05$), meaning in life ($r = .31, p < .01$), and self-esteem ($r = .29, p < .05$). AM was negatively associated with meaning in life ($r = -.52, p < .01$), self-esteem ($r = -.40, p < .01$), and a well-being index ($r = -.41, p < .01$). There was no significant relationship between any of the four types of motivation and depression.
Altintas et al., 2017 (France)	English, cross-sectional	$N = 112$ (20 men, 92 women), $M_{age} = 84.17$ years (nursing home)	Elderly Motivation Scale (Vallerand & O'Connor, 1989, 1991; self-report)	Adaptation to nursing home	The autonomy index was positively associated with adaptation to the nursing home ($r = .20, p < .05$). Relatedness satisfaction: Participation in leisure activities →Autonomy index →Adaptation to nursing home;→ Relatedness

Table 2
Continued

Authors (country)	Publication language, study design	Participants (living situation)	Motivation measure	Well-being indicators	Representative findings
Kasser & Ryan, 1999 (USA)	English, cross-sectional	$N = 50$ (39 women, 11 men), 70–99 years, $M_{\text{age}} = 83$ years (nursing home)	Autonomous Self-Regulation (Vallerand, & O'Connor, 1989; self-report)	Anxiety, depression, well-being: Rand Health Insurance Questionnaire (Brook et al., 1979); Subjective vitality: Life Satisfaction Scale (Diener et al., 1985); perceived health; morality index Perceived health	Autonomous motivation was positively associated with vitality ($r = .37$, $p < .05$).
Losier, Bourque, & Vallerand, 1993 (Canada)	English, cross-sectional	$N = 102$ (66 women, 36 men), age range: 65–93 years, $M_{\text{age}} = 73.8$ years (home)	Leisure subscale of the Elderly Motivation Scale (Vallerand & O'Connor, 1991; self-report)	Perceived health	No significant differences were found between perceived health and autonomous motivation ($r = .17$, <i>ns</i>) and control motivation ($r = -.10$, <i>ns</i>).
O'Connor & Vallerand, 1994 (Canada)	English, cross-sectional	$N = 129$ (111 women, 18 men), 65–96 years, $M_{\text{age}} = 80.5$ years (nursing home)	Elderly Motivation Scale (Vallerand & O'Connor, 1989, 1991; self-report)	Psychological adjustment: Satisfaction With Life Scale (Pavot, Diener, Colvin, & Sandvik, 1991); Self-Esteem Scale (Rosenberg, 1979); Beck Depression Inventory (Beck, 1967); meaning in life (Kane & Kane, 1981)	IM and ID were positively associated with psychological adjustment ($r = .57$, $p < .001$; $r = .47$, $p < .001$); EX and AM were negatively associated with psychological adjustment ($r = -.46$, $p < .001$; $r = -.53$, $p < .001$); autonomous motivation: →Psychological adjustment ($R^2 = .41$, $p < .001$).
Philippe & Vallerand, 2008 (Canada)	English, longitudinal	Time 1: $N = 126$, age range: 65–96 years, $M_{\text{age}} = 80.48$ years Time 2: $N = 83$ (nursing homes)	Elderly Motivation Scale (Vallerand & O'Connor, 1991; self-report)	Psychological adjustment: Beck Depression Inventory (Beck et al., 1961); Satisfaction With Life Scale (Diener et al., 1985); Meaning of Life Scale (Reker et al., 1987); Self-Esteem Scale (Rosenberg, 1965)	Autonomous motivation was positively associated with psychological adjustment ($r = .62$, $p < .001$). Actual Autonomy-Supportive Environments →Perceptions of autonomy →Autonomous motivation → Change in psychological adjustment.
Sheldon & Kasser, 2001 (Columbia)	English, cross-sectional	N total = 108 (36 men, 72 women), $n = 26$ aged ≤ 20 years, $n = 27$ aged 21–39 years, $n = 32$ aged 40–59 years, $n = 23$ aged ≥ 60 years, $M_{\text{age}} = 41.97$ years (home)	Striving Self-Determination (Sheldon & Kasser, 2001; self-report)	Positive and Negative Affect Schedule (Watson, Tellegen, & Clark, 1988); Satisfaction With Life Scale (Diener et al., 1985); Aggregate well-being	Autonomous motivation was positively associated with positive affect ($r = .24$, $p < .05$), life satisfaction ($r = .23$, $p < .05$), and aggregate well-being ($r = .30$, $p < .01$) and negatively associated with negative affect ($r = -.29$, $p < .01$).
Solberg et al., 2013 (Norway)	English, longitudinal	$N = 118$, $M_{\text{age}} = 74.3$ years, intervention group ($n = 85$), control	Motivation for exercise: Behavioral Regulation in	Subjective Vitality Scale (Ryan & Frederick, 1997); Subjective well-being: Positive	Change in autonomous motivation was positively associated with change in vitality

Table 2
Continued

Authors (country)	Publication language, study design	Participants (living situation)	Motivation measure	Well-being indicators	Representative findings
		group ($n = 33$) (home)	Exercise Questionnaire (Mullan, Markland, & Ingledew, 1997; self-report)	and Negative Affect Schedule (Watson, Tellegen, & Clark, 1988); Satisfaction With Life Scale (Pavot & Diener, 1993)	($r = .27, p < .01$). Change in controlled motivation was negatively associated with change in subjective well-being ($r = -.22, p < .05$).
Stephane, Boiché, & Scanff, 2010 (France)	English, cross-sectional	Persistent group: $n = 332$ women, age range: 60–88 years, $M_{\text{age}} = 70.88$ years Dropout group: $n = 242$ women, age range: 58–87 years, $M_{\text{age}} = 71.65$ years (home)	Sport Motivation Scale (Brière et al., 1995; self-report)	Subjective health	No significant ($F = 1.69, ns$) differences were found among the three groups for subjective health: high combined motivation, high introjected motivation, and moderate introjected motivation.
Vallerand, O'Connor, & Hamel, 1995 (Canada)	English, cross-sectional	$N = 77$ (58 women, 19 men), 60–98 years, $M_{\text{age}} = 82.6$ years (nursing home)	Elderly Motivation Scale (Vallerand & O'Connor, 1991; self-report)	Satisfaction With Life Scale (Pavot et al., 1991); Self-Esteem Scale (Rosenberg, 1979); Beck Depression Inventory (Beck, 1967); meaning in life (Kane & Kane, 1981); General health	IM was positively associated with self-esteem ($r = .53, p < .05$), life satisfaction ($r = .39, p < .001$), and negatively associated with depression ($r = -.42, p < .05$). ID was positively associated with general health ($r = .28, p < .05$) and negatively associated with depression ($r = -.44, p < .05$). EX was negatively associated with life satisfaction ($r = -.28, p < .05$). AM was negatively associated with self-esteem ($r = -.58, p < .01$), life satisfaction ($r = -.24, p < .05$), and general health ($r = -.26, p < .05$).

IM = intrinsic motivation (intrinsic regulation); ID = identified motivation (identified regulation); EX = external motivation (external regulation); AM = amotivation (non-regulation); Intro = introjected motivation (introjected regulation).

Inventory (McAuley, Duncan, & Tammen, 1989), the 10-item Need for Relatedness Scale (Richer & Vallerand, 1998), the Need-Satisfaction Questionnaire (Sheldon et al., 2001), the Relative Autonomy Index (Sheldon & Elliot, 1999), Competence Satisfaction (Reis et al., 2000), the Health-Care Climate Questionnaire (Williams, Grow, Freedman, Ryan, & Deci, 1996), the Relationship Quality Questionnaire (Dean et al., 1989), and the Basic Psychological Needs in Exercise Scale (Vlachopoulos & Michailidou, 2006). These scales and their dimensions are described in Table 4.

Contribution of autonomy satisfaction to well-being.

Among the 14 studies investigating needs satisfaction in the elderly, 10 studies addressed autonomy need satisfaction. The results show that among the elderly, the actual supported-autonomy environment is positively associated with the perception of autonomy (Philippe & Vallerand, 2008). Perceived autonomy support is positively correlated with autonomy need satisfaction (Souesme et al., 2016). Furthermore, autonomy need satisfaction is positively associated with well-being (Ferrand et al., 2014; Kanning &

Table 3
Meta-Analytic Results of the Relationships Between Well-Being and Basic Psychological Needs Satisfaction

Variables	Studies	k	n	I ²	P	Model	r	p	95% CI
Autonomy and subjective health	Custers et al. (2012); Ryan (1999)	2	6125	0.0%	.92	Fixed effect model	.21	<.01	[.06, .35]
Autonomy and depression	Ferrand, Martinent, & Charry (2015); Ferrand, Martinent, & Durmaz (2014); Kasser & Ryan (1999); Souesme, Martinent, & Ferrand (2016)	4	350	0.0%	.43	Fixed effect model	-.27	<.001	[-.36, -.18]
Autonomy and apathy	Ferrand, Martinent, & Charry (2015); Souesme, Martinent, & Ferrand (2016)	2	200	26.3%	.24	Fixed effect model	-.40	<.001	[-.51, -.28]
Competence and depression	Ferrand, Martinent, & Charry (2015); Ferrand, Martinent, & Durmaz (2014); Souesme, Martinent, & Ferrand (2016)	3	300	70.8%	.03	Random effects model	-.37	<.001	[-.54, -.17]
Competence and apathy	Ferrand, Martinent, & Charry (2015); Souesme, Martinent, & Ferrand (2016)	2	200	0.0%	.42	Fixed effect model	-.55	<.001	[-.64, -.45]
Relatedness and subjective health	Custers et al. (2012); Ryan (1999)	2	6125	96.0%	<.001	Random effects model	-.07	.88	[-.76, .69]
Relatedness and depression	Ferrand, Martinent, & Charry (2015); Ferrand, Martinent, & Durmaz (2014); Kasser & Ryan (1999); Souesme, Martinent, & Ferrand (2016)	4	350	67.0%	.03	Random effects model	-.17	.08	[-.34, .02]

Table 3
Continued

Variables	Studies	k	n	I ²	P	Model	r	p	95% CI
Relatedness and apathy	Ferrand, Martinent, & Charry (2015); Solberg et al. (2012)	2	200	93.1%	.001	Random effects model	-.29	.27	[-.69, .23]
Global need and life satisfaction	Custers et al., (2010,32013); Mackenzie, Karaolas, & Starzyk (2017)		190	16.5%	.30	Fixed effect model	.37	<.001	[.26, .47]
Global need and depression	Custers et al., (2010,32013); Philippe & Vallerand (2008)		212	0.0%	.45	Fixed effect model	-.48	<.001	[-.58, -.37]

Note. k = number of independent samples; n = number of participants. I² refers to heterogeneity, r = average-weighted correlation coefficient; CI = confidence interval.

Hansen, 2016; Kasser & Ryan, 1999), positive affect (Hahn & Oishi, 2006; Kanning & Hansen, 2016), life satisfaction (Custers, Westerhof, Kuin, Gerritsen, & Riksen-Walraven, 2013; Kasser & Ryan, 1999), vitality (Kasser & Ryan, 1999; Solberg et al., 2012), and psychological adjustment (Philippe & Vallerand, 2008).

Autonomy satisfaction is negatively correlated with depression symptoms (Custers et al., 2013; Ferrand, Martinent, & Charry, 2015; Kasser & Ryan, 1999; Souesme et al., 2016) and apathy (Ferrand et al., 2015; Souesme et al., 2016).

However, some studies did not find significant correlations between autonomy satisfaction and depression (Ferrand et al., 2014) or anxiety (Kasser & Ryan, 1999).

Contribution of competence satisfaction to well-being.

Among the 14 studies that measured needs satisfaction, nine studied competence need satisfaction. The results showed that fulfillment of competence needs is positively correlated with psychological well-being (Ferrand et al., 2014), positive affect (Hahn & Oishi, 2006; Kanning & Hansen, 2016), life satisfaction (Custers et al., 2013), and vitality (Solberg et al., 2012, 2013).

Fulfillment of competence needs was negatively associated with symptoms of depression (Custers et al., 2013; Ferrand et al., 2015; Souesme et al., 2016) and apathy (Ferrand et al., 2015; Souesme et al., 2016). However, no significant correlation between competence satisfaction and depressive feelings was found by Ferrand et al. (2014).

Contribution of relatedness satisfaction to well-being.

The results of the 10 studies that addressed the satisfaction of relatedness needs in the elderly showed that the fulfillment of relatedness needs was positively associated with purpose of life (Ferrand et al., 2014), positive affect (Hahn & Oishi, 2006; Kanning & Hansen, 2016; Kasser & Ryan, 1999), perceived health (Abolfathi Momtaz et al., 2014; Kasser & Ryan, 1999), and vitality (Kasser & Ryan, 1999; Solberg et al., 2012). Relatedness need satisfaction was negatively correlated with negative affect (Hahn & Oishi, 2006), depressive symptoms (Souesme et al., 2016), and apathy (Souesme et al., 2016).

However, Custers, Westerhof, Kuin, Gerritsen, and Riksen-Walraven (2012) found contradictory results in the context of caregiving relationships. Their results showed that relatedness satisfaction was negatively associated with

Table 4
Description of the Need Satisfaction Scales Used in the Included Studies

Questionnaire	Version	Dimensions of questions
Perceived autonomy support: Health-Care Climate Questionnaire (Williams, Grow, Freedman, Ryan, & Deci, 1996)	Self-report	<ul style="list-style-type: none"> To measure patients' perceptions of staff autonomy support (e.g., "I feel the staff provides me with choices and opinions")
Relationship Quality Questionnaire (Dean et al., 1989)	Self-report	<ul style="list-style-type: none"> The perception of an individual's relationship with family and friends
Need-Satisfaction Questionnaire (Sheldon et al., 2001)	Self-report	<ul style="list-style-type: none"> Feeling that they have many positive qualities for self-esteem Feeling that their choices reflect their true interests for autonomy Feeling that they can complete difficult tasks for competence Feeling connected with people around them for relatedness Feeling a sense of deeper purpose in life for self-actualization/meaning Feeling a sense of physical well-being for physical thriving Feeling new sensations for pleasure-stimulation Feeling that they can buy most of the things they want for money/luxury Feeling that their lives are structured and predictable for security Feeling that other people respect their advice for popularity/influence
Basic Need Satisfaction in Life Scale (Gagné, 2003)	Self-report	<ul style="list-style-type: none"> Autonomy: Do you feel that you are free to decide for yourself how to live your life? Relatedness: Do you like the people you interact with? Competence: Do people you know tell you that you are good at what you do?
Fulfillment of residents' three basic needs (Custers, Kuin, Riksen-Walraven, & Westerhof, 2009)	Video observations	<ul style="list-style-type: none"> Support of autonomy: reflects the extent to which the caregiver respects the resident's opinion, motives, and perspective and supports the resident's choices concerning, for example, the clothes he or she wants to wear. Support of competence: reflects the extent to which the caregiver supports the resident in carrying out the morning routine as independently as possible by adequately structuring the situation and by supportive behaviors, such as handing a towel or asking the resident to help with washing or shaving. Support of relatedness: reflects the extent to which the caregiver shows warm interest, makes conversation, and provides emotional support to the resident.
Modified Medical Outcomes Study Social Support Survey (Sherbourne & Stewart, 1991)	Self-report	<ul style="list-style-type: none"> Giving support: respondents were asked whether they had provided any social support to others, including friends, neighbors, and relatives, in the past 12 months to measure giving support (e.g., "When they talk, you listen to them"). Received support: whether respondents had received any social support from others, including friends, neighbors, and relatives, in the past 12 months to measure giving support (e.g., "When you talk, there is someone to listen to you").
Autonomy satisfaction: A model of contextual motivation in physical education (Standage et al., 2003)	Self-report	<ul style="list-style-type: none"> To assess satisfaction of the need for autonomy, five items collated by Standage et al. (2003) were used (e.g., "I feel free to express ideas and opinions"). Total possible score = 25.
Competence satisfaction: Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting (McAuley, Duncan, & Tammen, 1989)	Self-report	<ul style="list-style-type: none"> Satisfaction of the need for competence was assessed using 5 items from the Competence subscale of the Intrinsic Motivation Inventory (McAuley, Duncan, & Tammen, 1989; e.g., "I often feel very competent").

Table 4*Continued*

Questionnaire	Version	Dimensions of questions
10-item Need for Relatedness Scale (Richer & Vallerand, 1998)	Self-report	<ul style="list-style-type: none"> Satisfaction of the need for relatedness was assessed using 6 items from the 10-item Need for Relatedness Scale (Richer & Vallerand, 1998; Total possible score = 30; e.g., "It's important for me to be close to others").
Autonomy satisfaction: Relative Autonomy Index (Sheldon & Elliot, 1999)	Self-report	<ul style="list-style-type: none"> Intrinsic motivation: I just felt like doing it Identified motivation: I believe these activities were meaningful and important Introjected motivation: I did not want to be blamed by someone External motivation: I wanted to be recognized by others for doing it
Competence satisfaction (Reis et al., 2000)	—	<ul style="list-style-type: none"> The psychological need for momentary competence was measured using the same single item that Reis et al. (2000) used: "I felt capable and competent during my activities of the last 10 min." The participants responded to this item on a 6-point scale ranging from 0 (<i>completely disagree</i>) to 5 (<i>completely agree</i>).
Basic Psychological Needs in Exercise Scale (Vlachopoulos & Michailidou, 2006)	—	<ul style="list-style-type: none"> Autonomy:The exercise program I follow is highly compatible with my choices and interests.I feel very strongly that the way I exercise perfectly fits the way I prefer to exercise.I feel that the way I exercise is definitely an expression of myself.I feel very strongly that I have the opportunity to make choices with respect to the way I exercise. Competence:I feel I have been making huge progress with respect to the end result I pursue.I feel that I execute very effectively the exercises of my training program.I feel that exercise is an activity in which I do very well.I feel that I can manage the requirements of the training program in which I am involved. Relatedness:I feel extremely comfortable with the other exercise participants.I feel that I associate with the other exercise participants in a very friendly way.I feel there are open channels of communication with the other exercise participants.I feel very much at ease with the other exercise participants.

subjective health: Elderly individuals with better subjective health experienced less relatedness with their caregivers.

The results of some of the studies indicated that there was no significant correlation between relatedness need satisfaction and depression (Ferrand et al., 2014, 2015; Kasser & Ryan, 1999), apathy (Ferrand et al., 2015), anxiety (Kasser & Ryan, 1999), or life satisfaction (Kasser & Ryan, 1999).

Contribution of general satisfaction to well-being.

To assess general need satisfaction, some studies used a questionnaire that measured satisfaction in each of the three dimensions. The results show that, in general, fulfillment of these three needs was positively associated with psychological well-being (Ferrand et al., 2014), purpose and growth (Mackenzie et al., 2017) and life satisfaction (Custers et al., 2013; Custers, Westerhof, Kuin, & Riksen-Walraven,

2010; Mackenzie et al., 2017) and negatively correlated with depression (Custers et al., 2010, 2013).

However, some of the results indicated that there was no significant correlation between general needs satisfaction and well-being, such as depression (Ferrand et al., 2014), or vitality (Solberg et al., 2012).

Meta-analytic results.

The above results (systematic review) qualitatively provide the current trend reflected by the reviewed literature despite the conflicting results. Compared to the qualitative results, the meta-analysis results are more persuasive, and the inconsistency of results across previous studies can be analyzed from them, thanks to their results using weighed effect sizes (Johnson & Boynton, 2008). Table 3 shows the meta-analytic results for the relationships between the basic psychological needs satisfaction and well-being. In general,

Table 5
Meta-analytic Results of the Relationships Between Well-Being and Motivation

Variables	Study	k	n	I ² (%)	P	Model	r	p	95% CI
IM and well-being indices	Altintas & Guerrien (2014); O'Connor & Vallerand (1994)	2	202	82.8	.02	Random-effects model	.48	<.001	[.36, .58]
IM and life satisfaction	Altintas & Guerrien (2014); Altintas, Majchrzak, Leconte, & Guerrien (2010); Vallerand, O'Connor, & Hamel (1995)	3	223	39.4	.19	Fixed-effect model	.29	<.001	[.16, .40]
IM and adaptation	Altintas, De Benedetto, & Gallouj (2017); Altintas et al. (2010)	2	189	20.5	.26	Fixed-effect model	.40	<.001	[.27, .51]
IM and self-esteem	Altintas & Guerrien (2014); Vallerand, O'Connor, & Hamel (1995)	2	150	84.1	.01	Random-effects model	.36	.07	[-.03, .66]
IM and depression	Altintas & Guerrien (2009, 2014); Vallerand, O'Connor, & Hamel (1995)	3	190	87.9	<.001	Random-effects model	-.23	.30	[-.58, .19]
ID and well-being indices	Altintas & Guerrien (2014); O'Connor & Vallerand (1994)	2	202	8.7	.30	Fixed-effect model	.43	<.001	[.30, .53]
ID and life satisfaction	Altintas & Guerrien (2014); Altintas et al. (2010); Vallerand, O'Connor, & Hamel (1995)	3	223	0.0	.67	Fixed-effect model	.19	<.01	[.06, .32]
ID and self-esteem	Altintas & Guerrien (2014); Vallerand, O'Connor, & Hamel (1995)	2	150	0.0	.90	Fixed-effect model	.30	<.001	[.15, .44]
ID and subjective health	Losier, Bourque, & Vallerand (1993); Vallerand, O'Connor, & Hamel (1995)	2	179	0.0	.45	Fixed-effect model	.22	<.01	[.07, .35]
ID and adaptation	Altintas, De Benedetto, & Gallouj (2017); Altintas et al. (2010)	2	189	0.0	.70	Fixed-effect model	.38	<.001	[.25, .50]
ID and depression	Altintas & Guerrien (2009, 2014); Vallerand, O'Connor, & Hamel (1995)	3	190	86.5	<.001	Random-effects model	-.19	.35	[-.54, .21]
EX and well-being indices	Altintas & Guerrien (2014); O'Connor & Vallerand (1994)	2	202	92.3	<.001	Random-effects model	-.23	.38	[-.64, .28]
EX and life satisfaction	Altintas & Guerrien (2014); Altintas et al. (2010); Vallerand, O'Connor, & Hamel (1995)	3	227	72.1	.03	Random-effects model	-.03	.80	[-.28, .21]
EX and self-esteem	Altintas & Guerrien (2014); Vallerand, O'Connor, & Hamel (1995)	2	150	66.4	.08	Random-effects model	-.14	.31	[-.40, .14]
EX and depression	Altintas & Guerrien (2009, 2014); Vallerand, O'Connor, & Hamel (1995)	3	190	76.5	.01	Random-effects model	.17	.26	[-.13, .45]
AM and well-being indices	Altintas & Guerrien (2014); O'Connor & Vallerand (1994)	2	202	6.9	.30	Fixed-effect model	-.49	<.001	[-.59, -.38]
AM and life satisfaction	Altintas & Guerrien (2014); Altintas et al. (2010); Vallerand, O'Connor, & Hamel (1995)	3	227	57.6	.09	Random-effects model	-.11	.30	[-.30, .10]
AM and self-esteem	Altintas & Guerrien (2014); Vallerand, O'Connor, & Hamel (1995)	2	150	51.3	.15	Fixed-effect model	-.50	<.001	[-.61, -.37]

Table 5
Continued

Variables	Study	k	n	I ² (%)	P	Model	r	p	95% CI
AM and adaptation	Altintas, De Benedetto, & Gallouj (2017); Altintas et al. (2010)	2	189	0.0	.93	Fixed-effect model	-.39	<.001	[-.51, -.27]
AM and subjective health	Losier, Bourque, & Vallerand (1993); Vallerand, O'Connor, & Hamel (1995)	2	179	71.2	.06	Random-effects model	-.12	.41	[-.38, .16]
AM and depression	Altintas & Guerrien (2009, 2014); Vallerand, O'Connor, & Hamel (1995)	3	190	27.1	.25	Fixed-effect model	.24	<.001	[-.10, .38]
SDI and well-being indices	Altintas & Guerrien (2014); Philippe & Vallerand (2008)	2	156	58.1	.12	Fixed-effect model	.54	<.001	[-.42, .65]
Autonomous motivation and subjective health	Kasser & Ryan (1999); Solberg, Halvari, & Ommundsen (2013)	2	168	0.0	.52	Fixed-effect model	.30	<.001	[-.15, .43]

Note. k = number of independent samples; n = number of participants. I² refers to heterogeneity, r = average-weighted correlation coefficient; CI = confidence interval; IM = intrinsic motivation (intrinsic regulation); ID = identified motivation (identified regulation); EX = external motivation (external regulation); AM = amotivation (non-regulation); SDI = Self-Determination Index.

the satisfaction of the three basic psychological needs was positively associated with the positive indicators of well-being (such as subjective health, life satisfaction, positive affect, and vitality; $r = .21$ to $.49$), and negatively related with the negative indicators of well-being (such as depression and apathy; $r = -.27$ to $-.55$). More precisely, autonomy satisfaction was positively associated with the positive indicators of well-being (subjective health, life satisfaction, positive affect, and vitality; $r = .21$ to $.49$, $k = 2$ to 3) and had no correlation with anxiety ($r = -.09$, $p = .38$, $k = 2$). The satisfaction of competence was negatively associated with well-being (depression and apathy, $r = -.55$ to $-.37$, $k = 2$ to 3); and global need satisfaction was positively correlated with life satisfaction ($r = .37$, $k = 4$) and negatively associated with depression ($r = -.48$, $k = 3$). However, there was no correlation between the fulfillment of relatedness and well-being (subjective health, apathy, depression).

Result 2: Contribution of motivation (type of motivation and regulatory style) to well-being among the elderly

Systematic review results.

The 12 remaining studies focused on the relationship between motivation and well-being among the elderly, as shown in Table 2. Of the 12 studies, nine were published in English, and three were published in French. With respect to the origins of the articles, five studies were from France, four were from Canada, and the rest were from Norway ($n = 1$), the United States ($n = 1$), and Columbia ($n = 1$). Concerning the living environment, six studies were conducted in nursing homes and six were conducted in communities. Concerning the type of study design, two studies used a longitudinal design, and the other 10 used a cross-sectional design. Five motivation questionnaires were used: the Elderly Motivation Scale (Vallerand & O'Connor, 1991), the Leisure Motivation Scale (Pelletier et al., 1996), Striving Self-Determination (Sheldon & Kasser, 2001), the Behavioral Regulation in Exercise Questionnaire (Mullan et al., 1997), and the Sport Motivation Scale (Brière et al., 1995). These scales and their dimensions are described in Table 6.

Autonomous motivation and well-being.

The results of the 12 studies measuring autonomous motivation among the elderly showed that autonomous motivation was positively associated with psychological adjustment (O'Connor & Vallerand, 1994; Philippe &

Table 6
Description of the Motivation Scales Used in the Included Studies

Questionnaire	Version	Dimensions of questions	Responses: Types of motivation
Leisure subscale of the Elderly Motivation Scale (Vallerand & O'Conner, 1991)	Self-report	Leisure: <ul style="list-style-type: none"> • In general, why do you engage in leisure activities? • Why do you engage in group leisure activities (with one or more persons)? • Why do you engage in personal leisure activities (alone)? • Why do you engage in sports or physical activities? 	<p>IM: I do it for the pleasure of doing it</p> <p>Autonomous extrinsic motivation: I choose to do it for my own good</p> <p>Controlled motivation: I do it because I am supposed to do it</p> <p>AM: I don't know why I do it; I don't see what's in it for me</p>
Elderly Motivation Scale (Vallerand & O'Conner, 1989, 1991)	Self-report	<ul style="list-style-type: none"> • Health • Religion • Biological needs • Interpersonal relations • Current events • Leisure activities 	<p>IM: I do it for the pleasure of doing it</p> <p>Autonomous extrinsic motivation: I choose to do it for my own good</p> <p>Controlled motivation: I do it because I am supposed to do it</p> <p>AM: I don't know why I do it; I don't see what's in it for me</p>
Striving Self-Determination (Sheldon & Kasser, 2001)	Self-report	<ul style="list-style-type: none"> • Degree of striving in each domain 	<p>IM: You pursue it because of the fun and enjoyment it provides you</p> <p>ID: You endorse it freely and value it for personal reasons</p> <p>Intro: You would feel ashamed, guilty, or anxious if you did not do it</p> <p>EX: Somebody else or your situation seems to demand it</p> <p>IM:</p>
Behavioral Regulation in Exercise Questionnaire (Mullan, Markland, & Ingledew, 1997)	Self-report	<ul style="list-style-type: none"> • Motivation for exercise 	<p>I exercise because it's fun I enjoy my exercise sessions I find exercise a pleasurable activity I get pleasure and satisfaction from participating in exercise</p> <p>ID:</p> <p>I value the benefits of exercise It's important to me to exercise regularly I think it is important to make the effort to exercise regularly</p> <p>I get restless if I don't exercise regularly</p> <p>Intro:</p> <p>I feel guilty when I don't exercise I feel ashamed when I miss an exercise session I feel like a failure when I haven't exercised in a while</p> <p>EX:</p> <p>I exercise because other people say I should I take part in exercise because my friends/family/spouse say I should</p> <p>I exercise because others will not be pleased with me if I don't I feel pressure from my friends/family to exercise</p> <p>IM:</p>
Motivation for Physical Activity Sport Motivation Scale (Brière, Vallerand, Blais, & Pelletier, 1995)	Self-report	<ul style="list-style-type: none"> • Physical activity 	<p>IM:</p> <ul style="list-style-type: none"> • To experience stimulation: for the excitement I feel when I am really involved in the activity • To learn: for the pleasure I feel while learning a training technique that I have never tried before • To accomplish something: for the pleasure I feel while executing certain difficult movements <p>EX:</p> <ul style="list-style-type: none"> • ID: because, in my opinion, it is one of the best ways to meet people • Intro: because it is absolutely necessary to do physical activity if one wants to be in shape • EX: because it allows me to be well regarded by people that I know <p>AM: It is not clear to me anymore</p>

IM = intrinsic motivation (intrinsic regulation); AM = amotivation (non-regulation); ID = identified motivation (identified regulation); = introjected motivation (introjected regulation); EX = external motivation (external regulation).

Vallerand, 2008), well-being (Altintas & Guerrien, 2014; Sheldon & Kasser, 2001), positive affect (Sheldon & Kasser, 2001), life satisfaction (Altintas & Guerrien, 2014; Sheldon & Kasser, 2001), meaning in life (Altintas & Guerrien, 2014), vitality (Kasser & Ryan, 1999), and self-esteem (Altintas & Guerrien, 2014).

Autonomous motivation was positively associated with adaptation of the elderly to the nursing home (Altintas et al., 2010, 2017) and with vitality (Solberg et al., 2013) but was negatively associated with depression (Altintas & Guerrien, 2009) and negative affect (Sheldon & Kasser, 2001).

In contrast, other studies reported that there was no significant correlation with life satisfaction (Altintas et al., 2010; Solberg et al., 2013) or with depression (Altintas & Guerrien, 2014).

IM and well-being.

The IM results reported in these 12 articles are as follows: IM was positively associated with psychological adjustment (O'Connor & Vallerand, 1994), life satisfaction (Altintas & Guerrien, 2014; Vallerand, O'Connor, & Hamel, 1995), self-esteem (Vallerand et al., 1995), and an index of well-being (a measure combining self-esteem, meaning in life, life satisfaction and depression; Altintas & Guerrien, 2014).

IM was also positively associated with adaptation of the elderly to the nursing home (Altintas et al., 2010, 2017). It was negatively associated with depression (Altintas & Guerrien, 2009; Vallerand et al., 1995).

Identified motivation and well-being.

Identified motivation was positively associated with psychological adjustment (O'Connor & Vallerand, 1994), well-being, life satisfaction, meaning in life, and self-esteem (Altintas & Guerrien, 2014). Identified motivation was positively associated with adaptation of the elderly to nursing homes (Altintas et al., 2010, 2017) and with general health (Vallerand et al., 1995). It was negatively associated with depression (Altintas & Guerrien, 2009; Vallerand et al., 1995).

However, some authors did not find a significant correlation between identified motivation and self-esteem (Vallerand et al., 1995) or life satisfaction (Vallerand et al., 1995).

External motivation and well-being.

External motivation was negatively associated with psychological adjustment (O'Connor & Vallerand, 1994), life satisfaction (Solberg et al., 2013; Vallerand et al., 1995), leisure satisfaction (Losier, Bourque, & Vallerand, 1993), and adaptation to the nursing home (Altintas et al., 2017).

Some authors found a positive association between external motivation and depression (Altintas & Guerrien, 2009) or vitality (Solberg et al., 2013). Others did not find a significant correlation between external motivation and self-esteem (Vallerand et al., 1995) or depression (Vallerand et al., 1995).

AM and well-being.

AM was negatively correlated with psychological adjustment (O'Connor & Vallerand, 1994), a well-being index (Altintas & Guerrien, 2014), life satisfaction (Vallerand et al., 1995), meaning in life (Altintas & Guerrien, 2014), and self-esteem (Altintas & Guerrien, 2014; Vallerand et al., 1995). AM was negatively correlated with adaptation of the elderly to nursing homes (Altintas et al., 2010, 2017) and general health (Vallerand et al., 1995).

AM was positively associated with depression (Altintas & Guerrien, 2009).

Some researchers did not find a significant correlation between AM and depression (Vallerand et al., 1995).

Meta-analytic results.

The above results provide qualitative findings concerning the relationship between motivation and well-being, and Table 5 shows the meta-analytic results of the relationships between these two variables. IM was positively associated with well-being (well-being indices, life satisfaction, adaptation, self-esteem, $r = .29$ to $.48$, $k = 2$ to 3); however, IM showed no correlation with self-esteem ($r = .36$, $p = .07$) or depression ($r = -.23$, $p = .30$). Identified motivation was positively correlated with well-being (well-being indices, life satisfaction, self-esteem, subjective health, adaptation, $r = .19$ to $.43$, $k = 2$ to 3). AM showed a negative relation with well-being (well-being indices, self-esteem, adaptation, $r = -.50$ to $-.39$, $k = 2$ to 3), and it was positively associated with depression ($r = .24$, $k = 2$). Self-determination index and autonomous motivation were positively correlated with well-being ($r = .54$, $k = 2$; $r = .30$, $k = 2$). There was no significant relation between identified motivation and depression. External motivation showed no correlation with any of the well-being indicators.

Discussion and perspective

We have presented a systematic review result and a meta-analysis result whenever possible with the aim of studying the relationship between basic psychological need satisfaction/motivation and well-being among the elderly. In this study, six electronic databases were used to identify the empirical studies that were published in English and French. In addition, CNKI was used to search for articles in Chinese. Ultimately, despite the differences amongst the diversity of questionnaires used, the various study designs (longitudinal or cross-sectional), the different living environments (hospital, nursing home, and residence), the differences in age (50–103 years), and other factors, including the results from these publications, are roughly described as follows: In line with SDT, the meta-analytic finding supported that basic psychological need satisfaction is positively associated with positive indicators of well-being (life satisfaction, positive affect, vitality, etc., $r = .21$ to $.49$), and negatively associated with negative indicators of well-being (depression, apathy, etc., $r = -.55$ to $-.27$). The weighted effect sizes generally ranged from small to moderate, or from small to high, indicating that the BPNT serves as an important mini-theory to explain the mechanism of well-being among the elderly. These results are relatively congruent with SDT, and, more precisely, outline the point of BPNT, which proposes that basic psychological needs satisfaction is essential for well-being. Conversely, need frustration is associated with decreased well-being (Ryan & Deci, 2001). In addition, there was no significant correlation between the fulfillment of relatedness and the positive indicators of well-being. These insignificant relationships could be due to the heterogeneity of previous results ($I^2 = 67\%$ to 96% , indicating moderate to high levels of heterogeneity). One potential moderator for the heterogeneous findings could be the use of different scales for measuring relatedness satisfaction (i.e., Basic Need Satisfaction in Life Scale, Gagné, 2003; 10-item Need for Relatedness Scale, Richer & Vallerand, 1998; Relationship Quality Questionnaire, Dean et al., 1989). Alternatively, these insignificant relationships may also be explained by the cultural factor. As Markus and Kitayama (1991, 2003) assumed, the contribution of relatedness satisfaction to well-being is not important for individuals in Western society, which promotes the values of individualism. Unfortunately, however, almost all the current research

is based on the elderly from Western societies. Consequently, the reliability and validity of some tools need to be further tested in the elderly population, and more empirical studies from collectivistic cultures should be developed in order to determine the impact of relatedness satisfaction to well-being in the field of aging.

With reference to the relationships between types of motivation and well-being, the meta-analytic findings generally confirmed the hypothesis of SDT, which points out that the more people's behavior is regulated through autonomous motivation, the better psychological health and well-being they will experience (Ryan & Deci, 2000, 2017). That means autonomous motivation (IM and identified motivation) would be positively associated with positive indicators of well-being and negatively associated with negative indicators of well-being, whereas controlled motivation (external motivation) and AM would be negatively correlated with positive indicators of well-being and positively correlated with negative indicators of well-being. However, two types of autonomous motivation (IM and identified motivation) showed no correlations with negative indicators of well-being (depression). These insignificant relationships could be due to the heterogeneity of previous results ($I^2 = 86.5\%$ to 87.9% , indicating moderate to high levels of heterogeneity). One potential moderator for the heterogeneous findings could be age range (see Table 2). Furthermore, it is interesting to note that there is no significant relationship to be found between external motivation and well-being and this finding is inconsistent with the points of SDT. These insignificant relationships could be due to the heterogeneity of previous results ($I^2 = 66.4\%$ to 92.3% , indicating high levels of heterogeneity). The tools used for measuring indicators of well-being that are very different from one another (i.e., the Geriatric Depression Scale, Bourque, Blanchard, & Vezina, 1990; the Beck Depression Inventory, Beck et al., 1961), could constitute a potential moderator for the heterogeneous findings. These insignificant relationships may also be interpreted as a special relationship between external motivation and well-being in the field of aging, which is different from that of other populations (Nie, Chua, Yeung, Ryan, & Chan, 2015; Vansteenkiste, Lens, De Witte, & Feather, 2005), or perhaps this kind of motivation is only related to some specific indicators of well-being, such as adaptation (Altintas et al., 2017). Unfortunately, there is not enough literature to combine those results, and some comparative research on

well-being between the elderly and other age groups is also needed in the future to further prove this.

This review has several limitations. First, it screened studies published in only three languages (Chinese, English, and French). Although these are the three most widely spoken languages in the world, collaborations should be conducted with more authors from other countries (such as Japan and Germany) if the opportunity arises in the future to obtain a more comprehensive overview with a more international outlook. Second, some potentially relevant studies, such as in-progress or unpublished studies, could not be included in this study. Third, some studies included in the systematic review lacked the necessary data for our analysis and consequently had to be excluded from the meta-analysis due to their different statistical methods (Abolfathi Momtaz et al., 2014; Kanning & Hansen, 2016; Solberg et al., 2012; Stephan et al., 2010) or because the computed data provided included those of younger people as well as older adults (Hahn & Oishi, 2006; Sheldon & Kasser, 2001). Fourth, due to the limited number of documents in the field of aging, even if some results between variables have been presented by empirical studies, and the necessary data have been provided by the authors—such as the relationships between autonomy satisfaction and psychological indices (Philippe & Vallerand, 2008), autonomy satisfaction and purpose in the life (Ferrand et al., 2014), competence satisfaction and vitality (Solberg et al., 2013), and relatedness and positive affect (Kasser & Ryan, 1999)—those results could not be used in the quantitative analysis as a number of single studies provided results for each relationship that were insufficient for conducting a meta-analysis. Finally, publication bias cannot be examined without a sufficient number of included studies. According to the “Cochrane Handbook” (Higgins & Green, 2011) and the opinion of Sterne et al. (2011), 10 studies, or at least five are required, in order to examine publication bias in order to examine publication bias.

Parallel to this, we have also summarized the following deficiencies from previous studies so that future researchers may benefit:

1. Sample size and design are crucial. The sample sizes of some of the studies included in the current review were limited. Indeed, although the collection of data from certain groups can prove difficult, small sample sizes do not support the generalizing of such results. With regard to study design, longitudinal studies are fewer than cross-sectional. Although longitudinal research requires

more time, it can better explain the causal relationship between variables and allows researchers to fully understand the determinants of well-being among the elderly.

2. The assessment system is not yet complete and credible. The questionnaires used in the included studies were very diverse. The diversity of the instruments used can make research more informative, but may also lead to inconsistent findings between studies focusing on the same variables. Almost all of the current research is based on self-reporting, while only two articles referred to staff reports (Custers et al., 2013; Philippe & Vallerand, 2008). On the contrary, additional reports from family members (husbands, wives, children, etc.) and medical staff (doctors, nurses, etc.) would make the assessment system more complete and more credible.
3. There are very few cross-cultural studies. Although SDT indicates the universal importance of the satisfaction of three psychological needs (autonomy, competence, relatedness), cross-cultural psychologists question the importance of autonomous satisfaction in a collectivist culture (Iyengar & Lepper, 1999; Markus & Kitayama, 1991, 2003). Hahn and Oishi (2006) concluded that the contribution of need satisfaction to well-being differs across the world. This issue should be studied further to better understand the similarities and differences in the contribution of the satisfaction of different needs to well-being among the elderly in different countries and cultures.

Overall, when compared to studies on the well-being of other populations (children, university students, adults, etc.), research among the elderly is still very sparse. Although we used three of the most widely spoken languages in the world (Chinese, English, and French), only 23 empirical studies on the application of SDT to well-being in later life were found; however, none of these were in Chinese. In China, current research with SDT perspective focuses only on the well-being of children (Fang, Sang, & Gu, 2012; Guo et al., 2014; Nigela, Xia, Yan, & Li, 2015; L. Wang, Tao, Fan, & Gao, 2015; Ye, Yu, & Hu, 2013), university students (Qiu, Jiang, & Wang, 2012; Shang, Bai, & Zhong, 2016; B. Y. Wang, 2013; Y. Wang, Chen, & Gan, 2016; H. J. Zhang, Guo, Chen, Qi, & Wang, 2015; X. X. Zhang & Zhang, 2012), and adults (F. Li, Xing, Wang, Ning, & Zheng, 2015; Xu, Jiang, & Qiu, 2013). This reality is contradictory to the phenomenon of world population aging. In selecting populations for future research, researchers should turn their attention to the aging population, whose well-being is receiving increasing social

attention, especially in countries such as China, where the problem of aging is rapidly accelerating and in which there are currently no comprehensive studies on the elderly's well-being.

Fortunately, although no study tackles the issue in China today, Chinese researchers have done many very interesting and valuable studies about aging versus well-being (Tang, Yang, & Wang, 2014; X. J. Zhang & Yang, 2013), self-efficacy and well-being (Ding, Ren, & Cui, 2012; Zhou, 2014), and social support and well-being (Chang, 2016; Gu, 2015; Y. S. Li, Zhao, & Zhang, 2008; Y. F. Liu, 2011; X. Zhang, Su, Xie, Zhang, & Wei, 2017; Zhao, 2011). These have explored the well-being of the elderly from a different perspective. In the future, if researchers can combine these studies with SDT theories and explore such variables as aging attitudes, self-efficacy, social support, and so on within the SDT framework, this may provide a new perspective for the study of the well-being of elderly people.

These findings almost consistently confirm the SDT hypothesis, providing us not only with a better understanding of the determinants of well-being within its framework but also with the basis and method for future clinical applications, such as intervention in nursing homes. In this regard, nursing staff ought to reflect on traditional nursing models. The ensuing challenge amounts to giving the elderly the opportunity to choose for themselves and make decisions (autonomy satisfaction), to manifest their abilities (competence satisfaction), to maintain a close relationship with others (relatedness satisfaction), and so forth. This will substantially contribute to the satisfaction of the elderly's basic psychological needs, thereby improving their well-being: life satisfaction, adaptation, and positive affect, etc.

Disclosure of conflict of interest

The authors declare there are no conflicts of interest.

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