

RUNNING HEAD: ENVIRONMENTS, MOTIVATION, AND PSYCHOLOGICAL ADJUSTMENT

Actual Environments Do Affect Motivation and Psychological Adjustment:

A Test of Self-Determination Theory in a Natural Setting

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February 22, 2007

Abstract

This study examined the impact of the actual environment on changes in psychological adjustment over time. According to Self-Determination Theory (SDT; Deci & Ryan, 1985, 2000), environments that are objectively supportive of autonomy should facilitate psychological adjustment through their impact on people's subjective perceptions of autonomy and self-determined motivation. The present study tested this hypothesis using a prospective design with nursing homes residents. Results from structural equation modeling showed that actual autonomy-supportive nursing home environments were positively associated with residents' perceptions of autonomy that in turn predicted self-determined motivation in major life domains. Self-determined motivation, in turn, predicted increases in psychological adjustment over a one-year period. Theoretical implications of the present findings are discussed in line with SDT.

Keywords: Self-Determination Theory, Autonomy Support, Psychological Adjustment

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Mrs. Brown was a very active senior citizen. Her friends and neighbors described her as a very dynamic and outgoing person, always in a good mood, and as possessing a very good sense of humor. However, she has recently moved to a nursing home where she has started to act very differently. Indeed, the nursing home staff now describes her as unhappy with little interest for interpersonal relationships. Why is it that certain environments make us feel energized, optimistic, and strong, while others may lead us to feel anxious and depressed? Based on Self-Determination Theory (SDT; Deci & Ryan, 1985a, 2000), the present research tested the hypothesis that environments trigger a motivational sequence that influences people's perceptions of autonomy and self-determined motivation in life that in turn affect psychological adjustment.

Self-Determination Theory (SDT)

According to SDT, the psychological need of autonomy is crucial for personal development, as it energizes a wide variety of adaptive behaviors and psychological processes (Deci & Ryan, 1985a). Autonomy refers to being self-initiating in regulating one's actions, to being able to make independent choices that are not constrained by others, and having sufficient opportunity for self-expression (Deci & Ryan, 1991; Koestner & Losier, 1996, 2002). SDT posits that exposure to autonomy-supportive environments leads to the fulfillment of the need for autonomy (Deci & Ryan, 1985a, 2002). An autonomy-supportive environment refers to environmental conditions that promote and facilitate one's possibility for being self-initiating and choosing one's own actions. A large body of research suggests that *perceived* autonomy-supportive environments facilitate one's perceptions of autonomy. For instance, Grolnick, Ryan, and Deci (1991) found that parental autonomy support (as perceived by children) regarding education was positively related to their perceptions of autonomy toward education. Similarly, Baard, Deci, and Ryan (2004) and Deci et al. (2001) have shown that employees' perceptions

of autonomy support from their managers were related to the employees' perceptions of autonomy. Finally, Vallerand, Fortier, and Guay (1997) also found that students' perceptions of teacher, parent, and school administration autonomy support were related to students' greater perceptions of autonomy. However, it appears that no research has looked at the relationship between *actual* autonomy support and perceptions of autonomy.

SDT further proposes the existence of different types of motivation that fall into two broad categories: Self-determined motivation and nonself-determined motivation (see also Vallerand, 1997; Vallerand & O'Connor, 1989). Self-determined motivation pertains to a behavior that is engaged in out of pleasure (intrinsic motivation) or out of choice and valued as being important (self-determined extrinsic motivation). Conversely, nonself-determined motivation refers to a behavior that is engaged in because of an external or internal pressure to do so (nonself-determined extrinsic motivation) or when one displays a relative lack of motivation (amotivation). According to SDT, environments that support the need for autonomy by promoting choices and initiatives will facilitate the person's self-determined motivation, as people are more likely to be self-determined when they can freely choose their actions (Deci et al., 2001; Koestner, Ryan, Bernieri, & Holt, 1984). On the other hand, environments that are controlling, that impose strict rules, and/or that constrain self-expressivity are likely to lead to nonself-determined motivation (Deci & Ryan, 1987). Much research in different life contexts has indicated that when perceptions of autonomy increase, self-determined motivation increases along, while when perceptions of autonomy are diminished, so does self-determined motivation (e.g., Vallerand et al., 1997). Similar findings have also been obtained in experimental research (e.g., Zuckerman, Porac, Lathin, Smith, & Deci, 1978).

Finally, SDT posits that motivation toward one's important life domains will be conducive to different levels of psychological adjustment. More specifically, self-determined

motivation should facilitate psychological adjustment, while nonself-determined motivation should be conducive to psychological dysfunction (Deci, 1980; Ryan, Deci, & Grolnick, 1995; Ratelle, Vallerand, Chantal, & Provencher, 2004). Such an assertion is again supported by several research findings which reveal that the most positive psychological consequences are derived from the most self-determined types of motivation, while the least self-determined forms of motivation usually produce the most negative consequences. Such results have been obtained with a variety of variables related to mental health such as life satisfaction, general positive emotions, creativity, feelings of hope in life, vitality, and the absence of suicidal ideation (for reviews, see Deci & Ryan, 1985a; Ryan, 1995; Vallerand, 1997) and with different age groups ranging from children (e.g., Gottfried, 1985) to the elderly (e.g., O'Connor & Vallerand, 1994; Vallerand & O'Connor, 1989; Vallerand, O'Connor, & Hamel, 1995).

Overall, support for an integrative sequence would appear to exist, as a number of experimental and correlational studies have independently tested each specific part of the sequence “Autonomy-Supportive Environments → Perceptions of Autonomy → Self-Determined Motivation → Psychological Adjustment” (see Vallerand, 1997). Some studies have tested some types of similar sequence. For instance, Grouzet, Vallerand, Thill, and Provencher (2004) have shown that perceived autonomy toward a task was conducive to self-determined motivation that was, in turn, conducive to consequences such as levels of concentration and deliberate future intentions to perform the task. Similarly, Deci et al., (2001) found that perceived autonomy support at work was conducive to need satisfaction that was, in turn, conducive to psychological consequences. Finally, Vallerand, Fortier, and Guay (1997) also assessed an extended sequence as they showed that perceived autonomy support (from parents, teachers, and school administration) positively predicted perceived school autonomy that was conducive to self-determination motivation at school and that was, in turn, predictive of intentions to dropout and

actual dropout one year later. Although these studies share some overlaps with the present research, they also differ on at least one significant point. All three studies assessed only autonomy support as *perceived* by the participants themselves. In the present research, we used an *objective* measure of autonomy-supportive environments. Such an addition is critical as people's perceptions of need satisfaction have been shown to differ as a function of their motivational orientation (Deci & Ryan, 1985b; Vallerand, 1997). Therefore, participants might perceive autonomy support only because they are autonomously oriented (e.g., Grolnick & Ryan, 1987). Measuring autonomy-supportive environments objectively thus appears essential. Therefore, one goal of the present research was to examine the role of actual autonomy-supportive environments on people's perceptions of autonomy.

A second goal of the present research was to test the entire motivational sequence from actual autonomy-supportive environments to psychological adjustment within the confines of the same study. Indeed, to the best of our knowledge, no study has tested all of the elements of the proposed sequence. This constitutes a critical assessment of SDT to test all the indirect effects of the variables involved in this sequence (e.g., the indirect effect of objective autonomy-supportive environments on psychological adjustment)—something that is not feasible when assessing only parts of this sequence (Asher, 1976). Thus, a second goal of the present research was to test the entire motivational sequence. In addition, this sequence was tested in a partly prospective design over a one-year period.

Finally, the third goal of the present research aimed at examining this prospective integrative sequence in a real-life setting, namely nursing homes for the elderly. In line with principles of SDT and past research, it was hypothesized that nursing home environments that objectively support the autonomy of their residents should allow them to experience perceptions of autonomy that should be associated, one year later, to residents' self-determined motivation

toward important life domains. Most research has looked at the association between perceptions of autonomy and self-determined motivation using cross-sectional designs (e.g., Grouzet et al., 2004; Vallerand et al., 1997). This type of design makes it difficult to determine whether perceptions of autonomy lead to self-determined motivation or vice versa. In the present research, we addressed this issue by inserting a one-year time interval between the assessments of residents' perceptions of autonomy and self-determined motivation¹. Finally, as much research has shown (e.g., O'Connor & Vallerand, 1994; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Ryan & Connell, 1989), self-determined motivation should, in turn, predict increases in psychological adjustment (i.e., lower depression and higher levels of life satisfaction, meaning of life, and self-esteem) over that one-year period.

Method

Participants

A total of 126 elderly were recruited from 11 senior nursing homes. Overall, participants were aged between 65 and 96 years ($M = 80.48$ years $SD = 7.12$ years). At Time 2 (one year later), 43 participants were deceased, could not be located, or refused to participate in the second part of the study. Final sample size was composed of 83 participants (a 35% attrition rate). Participants who were lost to follow-up did not differ on the model variables from participants who took part in both phases of the study, except for life satisfaction. Participants who did not participate at Time 2 had reported lower levels of life satisfaction at Time 1 ($M = 4.38$, $SD = 1.33$) than those who participated in the two phases of the study ($M = 5.08$, $SD = 1.42$), $F(1, 124) = 7.12$, $p < .05$, $\eta = .05$.

Baseline Measures (Time 1)

Actual Autonomy Support in Nursing Homes. The degree of actual autonomy support provided by each nursing home was obtained from an interview of a trained research assistant

with the head nurse of each nursing home. The interview focused on how much choice and autonomy residents had concerning their daily activities and how much initiative they could take. These were assessed with thirteen aspects including 1) how free participants were to be visited, 2) feelings of freedom provided by the institution appearance and design (e.g., space availability, esthetic appearance, length of the exterior view), 3) availability of outdoor peripheral areas, 4) private vs. common bedrooms, 5) availability to choose from different activities and leisure, 6) choice of lunch time, 7) choice of lunch place, 8) supportive relationships with the staff, 9) possibility to engage freely in various common tasks, 10) freedom to decorate and arrange one's apartment appearance (or room) and nursing home, 11) freedom to leave for vacations, 12) freedom to take care of an animal, and 13) levels of residents' opportunities to show initiatives. These aspects have been derived from past research on autonomy support and from pilot interviews with old adults living in nursing homes. The trained research assistant wrote all information provided by the head nurse on a spreadsheet with separate columns for each aspect for each nursing home. Three psychologists highly familiar with SDT independently rated the degree of self-determination provided by each nursing home on each aspect on a nine-point scale (1 = *Not supportive of autonomy at all*, 9 = *Extremely supportive of autonomy*). One-way random effect intraclass correlation was $r = .96$ (the comparison point is the average measure of the three raters). The mean autonomy-support score for nursing homes was 5.18 (SD = 1.09) and ranged from 3.30 to 6.93.

Perceptions of Autonomy. Four items derived from past research (Reid, Haas, & Hawkings, 1977; Wolk & Telleen, 1976) assessed residents' feelings of choice and freedom. These items were 1) "*How often can you yourself decide what your everyday behaviors are going to be?*", 2) "*Residents in this home can solve problems by taking the initiative on their own*", 3) "*Residents in this home have free access to the rooms and different facilities of the center*", 4)

“The people who work in this home give me the freedom to do what I choose to and do not force me to do things”. These four items were responded to on a 7-point Likert scale ($\alpha = .71$).

Psychological Adjustment. To assess psychological adjustment, participants were administered four different scales. The first one was a short version of the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, J., 1961) composed of three items rated on a 4-point scale (ranging from 0 to 3) pertaining to feeling of failure (e.g., *“I feel I am a complete failure as a person”*), disappointment in oneself, and hopelessness (Kane & Kane, 1981). Adequate validity and reliability for this short scale have been reported (Kane & Kane, 1981) and high correlations have been reported between the short-version and the full-version of the BDI (see Dyce, 1996). Alpha coefficient in this study was .68. The second scale was the Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, and Griffin, 1985). This scale contains five items and assesses global life satisfaction. A sample item is *“if I could live my life over, I would change almost nothing”*. Alpha coefficient in this study was .87. The third scale was an adapted 5-item version from Reker, Peacock, and Wong (1987) tapping meaning in life (MLS; Meaning of Life Scale). A sample item is *“I believe my life has meaning now”*. Alpha coefficient in this study was .81. The fourth scale to be used was the 5-item short scale of the Rosenberg's Self-Esteem scale (RSS; Rosenberg, 1965). A sample item is *“I feel that I am a person of worth, at least on an equal plane with others”*. Alpha coefficient was .76 in this study. Participants indicated their degree of agreement on all the items on a 7-point Likert scale ranging from 1 - *Do not agree at all* to 7 - *Extremely agree* (except for those of the BDI ranging from 0 to 3). A composite score labeled psychological adjustment was constructed by reversing the scores of the BDI, and by computing the mean scores of all the z-score items of the four scales. Alpha coefficient for this composite index was .88.

Questionnaire at Time 2 - One Year Later

The Elderly Motivation Scale (EMS). The EMS (Vallerand & O'Connor, 1989, 1991; Vallerand, et al., 1995) is a 72-item scale that assesses motivational styles when engaging in various daily activities in six life domains: health, religion, biological needs, interpersonal relationships, current events, and leisure activities. Three questions per life domain ask participants why they engage in a particular activity related to this life domain. For instance, for the health domain, the three questions were 1) “*why do you engage in various activities related to your health*”, 2) “*Why do you follow your nutrition/diet*”, 3) “*Why do you take appointment with your doctor*”. These six domains and related questions have been developed from semi-structural interviews with old adults with the goal of highlighting their daily needs and activities (Vallerand, et al., 1995; Vallerand & O'Connor, 1989, 1991). For each of the three questions per domain, participants are asked to rate the same four items corresponding to each of four types of motivation: 1) “*I don't know, I don't see what it does for me*” (Amotivation; $\alpha = .94$), 2) “*Because I am supposed to do it*” (Nonself-Determined Extrinsic Motivation; $\alpha = .61$), 3) “*Because I choose to do it for my own good*” (Self-Determined Extrinsic Motivation; $\alpha = .71$), 4) “*For the pleasure of doing it*” (Intrinsic Motivation; $\alpha = .90$). These ratings were made on a Likert scale ranging from 1 (*Not at all*) to 7 (*Exactly*). The EMS has shown adequate construct, convergent, and predictive validity (O'Connor, Vallerand, 1994; Vallerand, et al., 1995; Vallerand & O'Connor, 1989, 1991), reliability (O'Connor, Vallerand, 1994; Vallerand, et al., 1995; Vallerand & O'Connor, 1989, 1991), and test-retest stability (Vallerand & O'Connor, 1991). Finally, a self-determination index (SDI) was constructed by weighting each type of motivation according to a continuum of self-determination, in line with SDT (Deci & Ryan, 2000). More specifically, a weight of +2 was awarded to the intrinsic motivation subscale and a weight of +1 was assigned the self-determined extrinsic motivation subscale since these

constructs correspond to self-determined motivation, with intrinsic motivation representing the highest level. A weight of -1 was allocated to the nonself-determined extrinsic motivation subscale and a weight of -2 was awarded to the amotivation subscale since these constructs correspond to nonself-determined motivation, with amotivation representing the highest level. Scores for each subscale were then multiplied by its corresponding weight and all product terms were added to yield an SDI to account for global self-determined motivation. This weighting technique has been used and reported by several authors (e.g., Blais et al., 1990; Vallerand & Bissonnette, 1992; Ratelle, Vallerand, Senecal, & Provencher, 2005; Richard & Schneider, 2005; Vallerand et al., 1997; also see Vallerand, 1997 and Vallerand & Ratelle, 2002 on this topic). Alpha for the SDI was .64 in this study.

Psychological Adjustment. To examine psychological adjustment at Time 2, participants were asked to complete the same four scales that were administered at Time 1. Alphas were .65, .83, .83, and .80 for the BDI, SWLS, MLS, and RSS, respectively. Alpha for this composite index was .90 at Time 2. All scales were completed at both Times 1 and 2 by residents during an interview with a trained research assistant.

Results

Table 1 reports the means, standard deviations, and correlations of all study variables. In order to test the hypothesized sequence, a path analysis with observed variables was conducted with LISREL 8 (Jöreskog & Sörborm, 2003).² The covariance matrix derived from the raw data served as the database for the path analysis and the method of estimation was Maximum Likelihood. Paths were drawn according to the proposed model and a positive covariance was estimated between the two exogenous variables (autonomy-supportive nursing homes and psychological adjustment at Time 1). In addition, a direct path from psychological adjustment at Time 1 to perceptions of autonomy was drawn, as these two variables were expected to covary at

Time 1.³ Results of the path analysis revealed an excellent fit to the data. The chi-square value was non-significant, $\chi^2 (df = 4, N=83) = 5.63, p = .23$, and other fit indices were excellent: NNFI = .96, CFI = .98, RMSEA = .068, GFI = .97, SRMR = .072, and NFI = .95. As shown in Figure 1, all estimated direct paths were significant at $p < .01$. Inspection of the correlation residuals revealed that all were below .10 and were non-significant, indicating that additional paths would not improve the model fits (Kline, 2005).⁴

Statistical tests were conducted in order to determine the significance of the mediators sequence. In order to test this, the whole model sequence was broken down in two parts in order to assess each part of the chain composed of a predictor, a mediator, and an outcome. In line with recent simulation studies with respect to mediation analyses (Mackinnon, Lockwood, Hoffman, West, & Sheets, 2002; Shrout & Bolger, 2002), we focused on the significance of the association between the predictor and the mediator and that of the mediator and the outcome—that is, Baron and Kenny's (1986) step 2 and 3—and tested the significance of the whole mediation sequence with Sobel Tests.⁵ If the Sobel Test is significant, the mediation effect is significant. As shown in Figure 1, all paths were significant. In other words, the associations between predictors and mediators and mediators and outcomes were significant. In addition, results from Sobel Tests (controlling for the exogenous covariable psychological adjustment at Time 1) revealed that the mediation “Actual Autonomy-Supportive Environments → Perceptions of Autonomy → Self-Determined Motivation” was significant, $z = 2.39, p < .01$ (bootstrap 95% confidence intervals: .033; .20). The effect size of this mediation effect was calculated using Shrout and Bolger's (2002) procedures which consist of the ratio of the indirect effect over the total effect, thus resulting in a ratio of the effect proportion mediated (P_M) ranging from 0 to 1 (with upper bound set to 1.00). The effect proportion for the above mediation was $P_M = 0.76$, thus indicating that 76% of the total effect between actual autonomy-supportive environments and self-determined

motivation was mediated by perceptions of autonomy. Results also showed that the mediation “Perceptions of Autonomy → Self-Determined Motivation → Psychological Adjustment (T2)” was also significant, $z = 2.62$, $p < .001$ (bias-corrected 95% confidence intervals: .001; .24) and $P_M = 1.00$, thus indicating that full mediation had occurred. Finally, in line with recently recommended statistical procedures to test a three-path mediated effect (see Taylor, MacKinnon, & Tein, 2008), results from the joint significance test ($p_{b1} < .05$ and $p_{b2} < .05$ and $p_{b3} < .05$, where b is the parameter estimate of each path in the sequence) showed that the indirect effect from nursing homes autonomy-support to psychological adjustment (T2) was significant at $p < .05$ (bootstrapped bias-corrected 95% confidence intervals: [.002; .024]). These results support the hypothesized motivational sequence from actual autonomy-supportive environments to increases in psychological adjustment in nursing homes residents.

Discussion

The present study was designed to examine the role of the environment in changes in psychological adjustment over a one-year period. More specifically, this study aimed at testing for the first time within the confines of the same study the integrative motivational sequence “Actual Autonomy-Supportive Environments → Perceptions of Autonomy → Self-Determined Motivation → Changes in Psychological Adjustment”. The findings provide support for the above sequence.

These findings lead to a number of implications. First, the present study is one of the first field studies to show the impact of objective autonomy-supportive environments on subjective perceptions of autonomy. The results showed strong support for the association of these variables, as the more autonomy supportive the actual environment, the greater the perceptions of autonomy. These findings support SDT claims that the actual environment plays an important role in providing people with opportunities to fulfill their needs (Deci & Ryan, 2002). Second,

results also provided support for SDT, as subjective perceptions of autonomy predicted self-determined motivation in major life domains one year later. This finding replicates past findings (e.g., Pelletier, Fortier, Vallerand, & Brière, 2001; Reeve & Deci, 1996; Vallerand et al., 1997; Zuckerman et al., 1978) that showed that satisfaction of the basic need for autonomy was in turn conducive to self-determined motivation in a number of activities. However, the present research extends those findings in two ways. First, the present study is one of the few studies to show the existence of this relationship with older adults, as past studies have typically used samples of students (e.g., Grouzet, et al., 2004). This test thus provides an external validity to the hypotheses derived from SDT. Second, the present results showed that subjective perceptions of autonomy mediated 76% of the total effect of the relationship between the objective autonomy-supportive environment and self-determined motivation in major life domains. These findings are in line with past research (e.g., Reeve & Deci, 1996) and support SDT's assertion that actual environments can either facilitate or thwart one's need for autonomy and thus have an important indirect impact on one's motivational processes.

A third implication of the present research is that the findings support SDT's claims to the effect that self-determined motivation in one's life is expected to contribute to psychological adjustment. Results also showed that self-determined motivation completely mediated the relationships between perceptions of autonomy and changes in psychological adjustment over a one-year period. The present research extends results of past studies (e.g., Niemiec et al., 2006; Grolnick & Ryan 1989; Sheldon & Kasser 1998) that obtained this relationship. Indeed, past research has typically employed a cross-sectional design. The fact that we replicated these findings using a prospective design provides additional support for SDT's claims that self-determined motivation plays a crucial role in the increases in psychological adjustment over time (see also Ratelle et al., 2004 on this issue). Furthermore, the results of the present research are

particularly interesting, as these were obtained with older adults, a population for whom psychological adjustment has been shown to be critical for life longevity and physical health (e.g., Jopp & Rott, 2006; O'Connor & Vallerand, 1998).

Finally, the present research is the first to assess the complete motivational sequence from actual autonomy-supportive environment to changes in psychological adjustment within the confines of the same study. This provides support for SDT. Indeed, it strongly suggests that actual autonomy-supportive environments do have an indirect effect on people's psychological adjustment overtime through the motivational sequence posited by SDT, that is perceptions of autonomy and self-determined motivation.

A number of limitations should be underscored from the present research. First, the sample size was small, thus it limits the representativeness of this sample for the general elderly population and the types of statistics that can be conducted. Indeed, because of the sample size, it was not possible to conduct a full multilevel structural equation modeling. In addition, small sample sizes might also yield high sampling error, biased parameter estimates, and typically have low power to detect significant effect. However, it did not appear to be the case in the present study as the RMSEA was low, correlation residuals were non significant, and parameter estimates were relatively high. Nevertheless, the present findings should be interpreted with caution. Future research is needed in order to replicate the present results with a larger sample size and a larger number of nursing homes. A second limitation concerns the measurement time points. Self-determined motivation was only measured once. Thus, no conclusion can be drawn with respect to its longitudinal evolution. Third, all participants were already in nursing homes at the time of the study. Thus, we cannot rule out the possibility that residents influenced their environment. However, because additional statistical analyses revealed that the number of years spent in the nursing homes was unrelated to the model variables, this possibility does not seem tenable. In any

event, future research might examine how exposition to a new living environment can influence peoples' perceptions of autonomy. Finally, it should be noted that the perceptions of autonomy measure was developed specifically for the present study and it might also assess residents' perceptions of autonomy support. One should thus be cautious in using this scale as a standard measure of perceptions of autonomy. Future research is needed in order to develop and validate measures that assess both constructs independently in field settings.

In sum, the present findings provide support for the integrative sequence "Actual Autonomy-Supportive Environment → Perceptions of Autonomy → Self-Determined Motivation → Changes in Psychological Adjustment". In line with SDT, it thus appears that environments can have a long-term impact on one's psychological adjustment, through one's perceptions of autonomy of the environment and self-determined motivation. Future research is needed in order to explore if other aspects of the actual environment (e.g., environments that promote SDT's other needs of competence and relatedness) can also have implications for motivation and psychological adjustment.

References

- Asher, H. B. (1976). *Causal modeling*. New York: Sage Publications.
- Baard, P.P., Deci, E.L., & Ryan, R.M. (2004). Intrinsic need satisfaction: A motivational basis of performance and well-being in two work settings. *Journal of Applied Social Psychology*, *34*, 2045–2068.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173–1182.
- Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, *12*, 57–62.
- Blais, M. R., Sabourin, S., Boucher, C., & Vallerand, R. J. (1990). Toward a motivational model of couple happiness. *Journal of Personality and Social Psychology*, *59*, 1021–1031.
- Deci, E. L. (1980). *The psychology of self-determination*. Lexington, MA: D. C. Heath (Lexington Books).
- Deci, E. L., & Ryan, R. M. (1985a). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Deci, E. L., & Ryan, R. M. (1985b). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality*, *19*, 109–134.
- Deci, E. L. & Ryan, R. M. (1987). The support of autonomy and the control of behavior. *Journal of Personality and Social Psychology*, *53*, 1024–1037.
- Deci, E.L., & Ryan, R.M. (2000). The "what" and the "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*, 227–268.
- Deci, E. L. & Ryan, R. M. (Eds.), (2002). *Handbook of self-determination research*. Rochester, NY: University of Rochester Press.

- Deci, E. L., Ryan, R. M., Gagné, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need satisfaction, motivation, and well-being in the work organizations of a former Eastern bloc country. *Personality and Social Psychology Bulletin*, *27*, 930–942.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction With Life Scale. *Journal of Personality Assessment*, *49*, 71–76.
- Gottfried, A. E. (1985). Academic intrinsic motivation in elementary and junior high school students. *Journal of Educational Psychology*, *77*, 257–274.
- Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children's learning: An experimental and individual difference investigation. *Journal of Personality and Social Psychology*, *52*, 890–898.
- Grolnick, W. S., & Ryan, R. M. (1989). Parent style associated with children's self-regulation and competence in school. *Journal of Educational Psychology*, *81*, 143-154.
- Grolnick, W. S., Ryan, R. M., & Deci, E. L. (1991). The inner resources for school performance: Motivational mediators of children's perceptions of their parents. *Journal of Educational Psychology*, *83*, 508–517.
- Grouzet, F. M. E., Vallerand, R. J., Thill, E. E., & Provencher, P. J. (2004). From environmental factors to outcomes: A test of motivational causal sequence. *Motivation and Emotion*, *28*, 331–346.
- Hershberger, S.L. (2006). The problem of equivalent structural models. In G.R. Hancock & R.O. Mueller (Eds.), *Structural equation modeling: A second course* (pp. 13–42). Greenwich, CT: Information Age Publishing.
- Hox, J. J. (2002). *Multilevel analysis. Techniques and applications*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Hox, J. J., & Maas, C. J. M. (2001). The accuracy of multilevel structural equation modeling

- with pseudobalanced groups and small samples. *Structural Equation Modeling*, 8, 157–174.
- Jopp, D., & Rott, C. (2006). Adaptation in very old age: Exploring the role of resources, beliefs, and attitudes for centenarians' happiness. *Psychology and Aging*, 21, 266–280.
- Jöreskog, K.G., & Sörbom, D. (2003). *LISREL 8.54 for Windows* (Computer software).
Lincolnwood, IL: Scientific Software International.
- Kline, R.B. (2005). *Principles and practice of structural equation modeling (2nd ed.)*. New York :
Guilford Press.
- Koestner, R., & Losier, G. F. (1996). Distinguishing reactive versus reflective autonomy. *Journal of Personality*, 64, 465–494.
- Koestner, R., & Losier, G. F. (2002). Distinguishing three ways of being highly motivated: A closer look at introjection, identification, and intrinsic motivation. In E.L. Deci & R.M. Ryan (Eds.), *Handbook of self-determination research* (pp. 101–121). Rochester, NY: University of Rochester Press.
- Koestner, R., Ryan, R. M., Bernieri, F., & Holt, K. (1984) Setting limits on children's behavior: The differential effects of controlling vs. informational styles on intrinsic motivation and creativity. *Journal of Personality*, 52, 233–248.
- MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*, 7, 83–104.
- Niemiec, C. P., Lynch, M. F., Vansteenkiste, M., Bernstein, J., Deci, E. L., & Ryan, R. M. (2006). The antecedents and consequences of autonomous self-regulation for college: A self-determination theory perspective on socialization. *Journal of Adolescence*, 29, 761-775.
- O'Connor, B. P., & Vallerand, R. J. (1994). Motivation, self-determination, and person-

environment fit as predictors of psychological adjustment among nursing home residents.

Psychology and Aging, 9, 189–194.

O'Connor, B. P., & Vallerand, R. J. (1998). Psychological adjustment variables as predictors of mortality among nursing home residents. *Psychology and Aging*, 13, 368–374.

Pelletier, G. L., Fortier, M. S., Vallerand, R. J., & Brière, N. M. (2001). Associations between perceived autonomy support, forms of self regulation, and persistence : a prospective study. *Motivation and Emotion*, 25, 279-306.

Ratelle, C. F., Vallerand, R. J., Chantal, Y., & Provencher, P. J. (2004). Cognitive adaptation and mental health: A motivational analysis. *European Journal of Social Psychology*, 34, 459–476.

Ratelle, C. F., Vallerand, R. J., Senecal, C., & Provencher, P. J. (2005). The relationship between school-leisure conflict and educational and mental health indexes: A motivational analysis. *Journal of Applied Social Psychology*, 35, 1800–1823.

Reid, D. W., Haas, G., & Hawkings, D. (1977). Locus of desired control and positive self-concept of the elderly. *Journal of Gerontology*, 32, 441–450.

Reis, H. T., Sheldon, K. M., Gable, S. L., Roscoe, J., & Ryan, R. M. (2000). Daily well-being: The role of autonomy, competence, and relatedness. *Personality and Social Psychology Bulletin*, 26, 419–435.

Reker, G. T., Peacock, E. J., & Wong, P. T. (1987). Meaning and purpose in life and well-being : A life-span perspective. *Journal of Gerontology*, 42, 44–49.

Richard, J. F., & Schneider, B. H. (2005). Assessing friendship motivation during preadolescence and early adolescence. *The Journal of Early Adolescence*, 25, 367–385.

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NH: Princeton University Press.

- Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality, 63*, 397–427.
- Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology, 57*, 749–761.
- Ryan, R. M., Deci, E. L., & Grolnick, W. S. (1995). Autonomy, relatedness, and the self: Their relation to development and psychopathology. In D. Cicchetti & D. J. Cohen (Eds.), *Developmental psychopathology: Vol. 1. Theory and methods* (pp. 618–655). New York: Wiley.
- Sheldon, K. M., & Kasser, T. (1998). Pursuing personal goals: Skills enable progress but not all progress is beneficial. *Personality and Social Psychology Bulletin, 24*, 1319–1331.
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods, 7*, 422–445.
- Stapleton, L. M. (2006). Using multilevel structural equation modeling techniques with complex sample data. In G. R. Hancock & R. Mueller (Eds.), *A second course in structural equation modeling* (pp. 415–445). Greenwich, CT: Information Age Publishing.
- Taylor, A. B., MacKinnon, D. P., & Tein, J.-Y. (2008). Tests of the three-path mediated effect. *Organization Research Methods, 11*, 241–266.
- Vallerand, R. J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (pp. 271–360). New York: Academic Press.
- Vallerand, R. J., & Bissonnette, R. (1992). Intrinsic, extrinsic, and amotivational styles as predictors of behavior: A prospective study. *Journal of Personality, 60*, 599–620.

- Vallerand, R. J., Fortier, M. S., Guay, F. (1997). Self-determination and persistence in a real-life setting : Toward a motivational model of high school dropout. *Journal of Personality and Social Psychology*, 72, 1161–1176.
- Vallerand, R. J., & O'Connor, B. P. (1989). Motivation in the elderly: A theoretical framework and some promising findings. *Canadian Psychology*, 30, 538–550.
- Vallerand, R. J., & O'Connor, B. P. (1991). Construction et validation de l'Échelle de Motivation pour les Personnes Agées (EMPA) [Construction and validation of the Elderly Motivation Scale (EMS)]. *International Journal of Psychology*, 26, 219–240.
- Vallerand, R. J., O'Connor, B. P., & Hamel, M. (1995). Motivation in later life: Theory and assessment. *International Journal of Aging and Human Development*, 41, 221–238.
- Vallerand, R. J., & Ratelle, C. F. (2002). Intrinsic and extrinsic motivation: A hierarchical model. In E.L. Deci & R.M. Ryan (Eds.), *Handbook of self-determination research* (pp. 37-63). Rochester, NY: University of Rochester Press.
- Wolk, S., & Telleen, S. (1976). Psychological and social correlates of residential constraint. *Journal of Gerontology*, 31, 89–98.
- Zuckerman, M., Porac, J., Lathin, D., Smith, R., & Deci, E. L. (1978). On the importance of self-determination for intrinsically motivated behavior. *Personality and Social Psychology Bulletin*, 4, 443–446.

Footnotes

1. Another approach would have been to measure residents' self-determined motivation twice—at Times 1 and 2. However, the length of the scale was a clear obstacle with such a type of population, especially knowing that the attrition rate is high and that the sample size is usually small. We wanted the maximum number of participants to take part in the second phase of the study. Therefore, we decided to use a short questionnaire at Time 1 and opted for the method of a one-year time interval between residents' perceptions of autonomy and self-determined motivation assessments.

2. Because we wanted to assess the influence of nursing homes' autonomy support on the motivational sequence at the *between level* of the nursing homes, we were interested in the between covariance of the model variables. We expected that the variance in nursing homes autonomy support between the nursing homes would lead to perceptions of autonomy at the mean average of the residents living in each nursing homes that would in turn lead to residents' mean average of self-determined motivation and residents' mean average of increases in psychological adjustment. Variation at the within level, that is variation among residents of a same nursing home, was also plausible because of individual differences—not all participants were equally self-determined or equally psychologically adjusted when entering their respective nursing home. Thus, these variations were expected and they were predicted to vary in the same direction of the hypothesized between level model (it was not the present research goal to examine differences between the nursing homes level [between level] and the residents level [within level]). Results from two separate path analyses using between and within (pooled) covariance matrices showed that model fit indices were excellent for both between and within models ($p_s > .35$; RMSEA = 0.00, CFI > .95, SRMR < .05), thus suggesting that there was variance to be modeled at both levels (between and within). However, the between level model had to be computed from 11

nursing homes (groups = $n = 11$). Therefore, not all parameter estimates were significant at $p < .05$ (they were at $p_{\text{one-tailed}} < .10$) (see Hox & Maas, 2001 for an estimation of the bias in parameter estimates with a small group sample size in a multilevel structural equation analysis). Because both covariance matrices fit adequately the hypothesized model, it was hypothesized that they should vary in the same direction, but independently from each other. If such was the case, they could thus be combined on this basis. To test this model of invariance, we examined concurrently the entire model composed of the between and within covariances using a multilevel structural equation modeling technique (see Hox, 2002; Stapleton, 2006). In this analysis, both matrices (between and within) are modeled together according to the hypothesized model and are expected to vary independently and to be equal—that is, each parameter estimate and measurement error at the within level is constrained to be equal to its corresponding one at the between level. Fit indices for this model were excellent, $\chi^2(10) = 11.69$, $p = .31$, CFI = .96, GFI = .97, RMSEA = .042, thus suggesting that the same hypothesized model held at both the between and within levels. Because both matrices were independent and adequately and equally fit the model, we thus computed a path analysis with the whole variance (i.e., without separating between and within variances) in order to evaluate the significance of the parameter estimates and provide mediation analyses with a sufficient power to detect them. The details of this path analysis are presented in the Results section.

3. The hypothesized path between psychological adjustment and perceptions of autonomy is equivalent to a covariance (see Hershberger, 2006; Kline, 2005 on equivalent models). However, because psychological adjustment at Time 1 is used as a control variable to remove shared variance with psychological adjustment at Time 2, it needs to be modeled as an exogenous variable in the model (psychological adjustment at Time 1 is not predicted by any variable). Hence, it is not well advised to have a covariance between an exogenous and endogenous

variable in a structural equation model (because the measurement error of an exogenous variable is fixed to 1.00 for identification purposes). Thus, it has been replaced with a direct path. It should be understood that psychological adjustment at Time 1 is not meant to be seen as predicting perceptions of autonomy, but is only correlated with it (a covariation). However, such a covariation is in line with past research that has shown that psychological adjustment is associated with greater perceptions of autonomy (Deci et al., 2001).

4. Controlling for residents' daily required number of care hours or residents' health level as rated by head nurses did not change the results. An alternative model was also tested. This alternative model tested the sequence "Actual Autonomy-Supportive Environment → Perceptions of Autonomy → Changes in Psychological Adjustment → Self-Determined Motivation". Results revealed poor fit indices for this model, $\chi^2 (df = 4, N=83) = 8.53, p = .07, RMSEA = .119$, thus suggesting that the original hypothesized model should be preferred. Other potential alternative models were not theoretically or methodologically possible, thus they were not tested.

5. Baron and Kenny's classical step 1—that is, to assess the correlation between the predictor and the outcome—was dropped as simulation studies have shown that this step is not a necessary condition (Mackinnon et al., 2002), particularly with distal effect (such as in a prospective study) and with small sample sizes (Shrout & Bolger, 2002).

Table 1

Means, Standard Deviations, and Correlations of the Model Variables

	Mean	S.D.	1	2	3	4
Nursing homes autonomy support (1)	5.18	1.09	--			
Psychological adjustment Time 1 (2) ^a	0.00	0.75	.11	--		
Residents' perceptions of autonomy (3)	6.23	1.02	.46***	.51***	--	
Self-determined motivation (4)	10.82	3.67	-.03	.25*	.31**	--
Psychological adjustment Time 2 (5) ^a	0.00	0.79	-.06	.53***	.35**	.62***

Note: $n = 83$, * $p < .05$, ** $p < .01$, *** $p < .001$

a = average of z-scores

Figure Captions

Figure 1. Path analysis of the model variables. All direct paths are significant at $p < .01$.

Standardized coefficients are presented.

