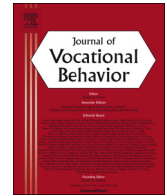




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# Developmental trajectories of vocational exploration from adolescence to early adulthood: The role of parental need supporting behaviors<sup>☆</sup>

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High school graduates are unstable in their vocational choice, where only 10% of young adults surveyed at age 25 had maintained the vocational decision they made at age 15 (Statistics Canada, 2015). Consequently, an individual's vocational choice is conceived not so much as a single choice, but rather as a series of interrelated decisions (Blau, Gustad, Jessor, Parnes, & Wilcock, 1956; Lent, Brown, & Hackett, 1994, 2000). In his vocational development theory, Super (1953) used the term vocational *development* rather than choice: he posited that everyone is unique and differs from others on several points, especially personality and interests. In light of these different characteristics, vocational preferences may vary across individuals, each of whom is trying to harness personal characteristics and preferences with the characteristics required by a professional training or a career. These abilities and preferences may vary over time, according to a longitudinal process, and change following many experiences (Super, 1953), something that has not empirically been tested. Hence, the present study seeks to bridge this gap by empirically examining distinct developmental patterns of vocational exploration, using a longitudinal and person-centred perspective, and to identify potential predictors for these patterns, in this case parental behaviors.

## 1. Vocational exploration

*Vocational exploration* (also known as career exploration; Stumpf, Colarelli, & Hartman, 1983) is an initial phase of adolescents' vocational decision-making process, which involves gathering information about the professional world while considering personal interests. It refers to any activity aimed at deepening individuals' knowledge of the various career possibilities they might consider. It is recognized as a central developmental task during adolescence and emerging adulthood (Porfeli, Lee, & Vondracek, 2013). Exploration activities allow youth to identify personal interests, possible fields of study, and potential professions (Germeijs & Verschueren, 2006), which is why some researchers have distinguished self-exploration from environment exploration (Stumpf et al., 1983; Stumpf & Colarelli, 1980). Self-exploration implies the discovery of interests, values, and personality traits that can guide a possible vocational choice. These individual characteristics contribute to adolescents' vocational exploration (Hirschi, Niles, & Akos, 2011; Schmitt-Rodermund & Vondracek, 1999; Stumpf et al., 1983). Exploring the environment involves taking part in activities of a guiding nature, such as visiting a workplace of interest or participating in activities to discover a profession. Students involved in vocational exploration, both through self and environment components, can in turn define their professional identities with greater

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ease (Gushue, Scanlan, Pantzer, & Clarke, 2006; Robitschek & Cook, 1999).

Thus far, the vocational literature has mainly focused on the role of internal characteristics as predictors of vocational exploration. Among these, personality (Reed, Bruch, & Haase, 2004; Robitschek & Cook, 1999; Rogers, Creed, & Glendon, 2008) and career-related self-efficacy (Chiesa, Massei, & Guglielmi, 2016; Cordeiro, Paixão, Lens, Lacante, & Luyckx, 2015; Creed, Patton, & Prideaux, 2007; Patton, Bartrum, & Creed, 2004) received the most scrutiny, as did a more descriptive variable: adolescents' gender (e.g. Blustein & Phillips, 1988; Hardin, Varghese, Tran, & Carlson, 2006; Russell, Gould, & Fergus, 2017). Nevertheless, the adolescents' living environments can also contribute to their vocational exploration, notably because individuals develop themselves through social interactions, relationships, and life contexts (Vondracek, 1990; Young, 1983). Social experiences contribute to personality development, and by interacting with others, individuals become aware of professional opportunities and limits (Blau et al., 1956; Flum, 2001), which contributes to their vocational choices. In this study, we examined the contribution of adolescents' social environment to their vocational exploration by focusing on parental behaviors using a self-determination perspective.

## 2. Parental contributions to youth's vocational exploration

Vocational development can be addressed as a family project in which parent-child interactions contribute to adolescents' vocational development through means such as parents providing opportunities to explore the adolescents' interests outside of school (Young et al., 2001). While often deemed important in adolescents' vocational decision-making tasks such as exploration (e.g., Ketterson & Blustein, 1997; Kracke, 1997, 2002; Young et al., 2001; Young et al., 2006), parents' contribution has been relatively understudied, and this neglect has been acknowledged in the vocational literature (Bryant, Zvonkovic, & Reynolds, 2006; Hartung, Porfeli, & Vondracek, 2005; Vondracek, 2001). Focusing on the role of parents concurs with findings regarding their predominant role in their children's overall development and well-being (Steinberg & Silk, 2002). Hence, by engaging in activities with their adolescents, parents support their vocational development, which translates into increased exploration during adolescence (Bryant et al., 2006; Schmitt-Rodermund & Vondracek, 1999). In this study, youth's exploration is examined from a developmental approach while considering the vital role played by parents. Given this focus on the interplay between youth's inner resources (exploration) and their interaction with their environment (parents) to satisfy its potentialities, relying on a theoretical framework anchored in an organismic dialectical perspective is particularly useful.

Self-determination theory (SDT; Ryan & Deci, 2017) posits that children's optimal development is dependent upon the satisfaction of their psychological needs. This meta-theory considers individuals' functioning and development by examining how their innate growth tendency manifests itself across developmental periods and life context as well as how one's social environment supports this inherent propensity. According to SDT, all individuals have three fundamental psychological needs: autonomy (i.e., behaving volitionally, feeling at the origin of actions), competence (i.e., perceiving one's actions as producing outcomes), and relatedness (i.e., establishing satisfying relationships with significant individuals). Decades of research showed that psychological need satisfaction promotes individuals' optimal development, particularly in the context of academic and professional development (Ryan & Deci, 2017). Thus, psychological need satisfaction can facilitate adolescents' optimal school and professional development by supporting their natural tendency to explore the world of work as well as who they are. For example, the satisfaction of adolescents' need for competence was found to contribute to their career and academic interest development, and vocational choices (Bartley & Robitschek, 2000; Cordeiro et al., 2015; Hirschi, Abessolo, & Froidevaux, 2015; Pop, Negru-Subtirica, Crocetti, Opre, & Meeus, 2016).

Alternatively, when their psychological needs are frustrated, adolescents' exploration of their environment and of themselves is undermined, most probably because it becomes anchored in external or internal pressures. This brings adolescents' focus on parental expectancies in terms of career options or neglects their natural preferences and interests in order to gain parental approval. Because of the contribution psychological need satisfaction can have for promoting vocational exploration, it becomes highly relevant to examine how parents can facilitate the satisfaction of adolescents' psychological needs. Indeed, SDT acknowledges that part of this satisfaction comes from within the individual, but that the parent-child relationship also supports the satisfaction of these needs (Ryan & Deci, 2017). Three dimensions of the parent-child relationship were found to facilitate the satisfaction of children's psychological needs, here referred to as parental *need supporting behaviors* (NSB).

### 2.1. Parental need supporting behaviors

A first parental NSB is *autonomy support*, which involves parents behaving in ways that allow children to freely express their opinions and feelings, and contribute to making plans and decisions that affect themselves and the family (Grolnick & Ryan, 1989; Ryan & Deci, 2017; Skinner, Johnson, & Snyder, 2005). It also involves offering children meaningful rationales for the demands and limits that parents have for them as well as recognizing their feelings and perspective, even when they are negative (Mageau et al., 2015). Parental autonomy support contributes to children's optimal development by enhancing their general well-being (Niemic et al., 2006; Soenens et al., 2007) and academic adjustment (see Ratelle & Duchesne, 2017), as well as their vocational development through their perceived competence and autonomy (Guay, Senécal, Gauthier, & Fernet, 2003). Adolescents also tend to engage more deeply in career exploration activities when they experience stronger parental career-related support (Dietrich & Kracke, 2009; Soenens & Vansteenkiste, 2005).

A second NSB is parental *involvement*, which refers to the provision and dedication of important resources to the child. These resources can be intellectual and material (e.g., buying books, taking part in intellectual events, exposing adolescents to cognitively stimulating activities; Grolnick & Slowiaczek, 1994), or more personal and emotional (e.g., devoting energy and time to the child, being interested and attentive to him/her; Grolnick & Slowiaczek, 1994). Parents can provide home-based involvement, by helping

adolescents to do their homework or asking them about academic issues (Pomerantz, Moorman, & Litwack, 2007) but involvement can also be school-based, as manifested by making actual contact with their adolescents' school (e.g., attending school meetings, talking to teachers, or volunteering at school; Pomerantz et al., 2007). Involvement contributes to adolescents' learning, perseverance (Barnard, 2004; Grolnick & Slowiaczek, 1994; Jeynes, 2005), and achievement in school (Hill & Taylor, 2004). Parental involvement can also contribute to these outcomes through the educational aspirations they have for their adolescents, which could be a manifestation of their involvement (Singh et al., 1995). However, studies on parental involvement in the context of vocational development are scarce and, to our knowledge, parental involvement was not examined in relation to vocational exploration.

Finally, *structure* is defined as how parents organize and manage the family environment to make it predictable, which facilitates the development of their children's competence (Farkas & Grolnick, 2010; Ryan & Deci, 2017). This category of NSB manifests itself through the clear communication of family rules and expectations that are constant and predictable, offering opportunities to meet these rules and expectations as well as feedback on adolescents' progress, explaining the rationale behind family rules and expectation, and exercising authority – that is, taking leadership in the household when required. Parental structure helps children understand how their actions are related to outcomes, which reinforces their functioning, competence, and self-regulation (Grolnick et al., 2014). Studies on parental structure in the context of vocational development are rare but given the positive academic outcomes associated to this parental behavior (e.g. Ratelle, Duchesne, Guay, & Boisclair Châteauevert, 2018), parental structure could contribute positively to youth's vocational exploration.

In sum, vocational exploration can be explained by internal (e.g., motivation, development, and confidence) as well as external factors such as parental NSB. While parental NSB are important predictors of adolescents' general development and well-being, they also have a positive contribution on their academic and vocational development. However, research specific to vocational development is limited. With respect to vocational exploration, research showed that adolescents who feel supported by their parents persevere and succeed more in school, get more involved in exploratory activities, and have greater academic and professional aspirations. While most of the past studies on exploration were not anchored in theories or conceptual models that identified the specific psychological mechanisms responsible for parents' positive contribution, using SDT will allow the identification of concrete intervention targets for improving youth's exploration (i.e., autonomy support, involvement, structure). Furthermore, the contribution of parents to their child's vocational development has mostly been studied using a variable-centred approach, which focuses on the relations between a set of variables (e.g., levels of parental autonomy support being positively associated with levels of career exploration; Dietrich & Kracke, 2009; Soenens & Vansteenkiste, 2005) and used cross-sectional or prospective design (i.e., including one or two measurement waves). Since vocational decision-making is a developmental process, using a longitudinal approach is best suited to study vocational exploration: in this study, adolescents' vocational exploration is examined longitudinally using a person-centred approach, which is described in the next section.

### 3. Developmental trajectories of vocational exploration

Because vocational exploration may develop differently for specific groups of individuals over the course of many years, using a longitudinal and person-centred approach appears more optimal to understand how adolescents engage in vocational exploration. From an analytical perspective, there are two approaches to examining the development of vocational exploration: a variable-centred and a person-centred approach (Morin, Meyer, Creusier, & Biétry, 2016; Morizot, 2003). As mentioned above, a variable-centred approach typically focuses on a limited set of variables and their interrelationships (e.g., examining the association between variables related to career exploration such as career indecision, planning and confidence; Porfeli & Skorikov, 2010) and assumes development to be homogeneous (i.e., only one pattern of development for a complete sample). This analytical approach is inappropriate for understanding the development of a person when it differs across subgroups of individuals (i.e. when change is heterogeneous; Morizot, 2003). Alternatively, a person-centred approach assumes that individuals from a same population may be different and cluster into subpopulation (Morin et al., 2016). Thus, emotions, cognitions, and behaviors are formulated and studied empirically in terms of distinct patterns within individuals, with results being generalized to subsets of individuals sharing target characteristics (Morizot, 2003). Delineating precise patterns of individual functioning over time is important because it allows the identification of more vulnerable individuals in a sample as well as the crucial moments when preventive measures should be implemented. In the current context, this involves examining distinct trajectories of adolescents' self and environment exploration to determine whether they engage in these activities in a uniform or differentiated fashion and if turning points can be identified.

Our review of the literature indicated that few studies on vocational exploration have used a truly longitudinal design where types of exploration were assessed multiple times (i.e., at least three assessments). Among these, most considered three measurement times over a period varying from 12 weeks (Guan et al., 2017) to 3 years (Porfeli & Skorikov, 2010), although the vast majority included measurement waves within a single academic year (Germeijs & Verschueren, 2006; Negru-Subtirica, Pop, & Crocetti, 2015; Pop et al., 2016). Some researchers adopted a variable-centred approach (e.g., Guan et al., 2017; Porfeli & Skorikov, 2010), where correlations among types of exploration and stability coefficients were estimated, while other studies used analyses such as latent growth curve modeling (LGCM) that can fall within a person-centred approach (e.g., Germeijs & Verschueren, 2006; Pop et al., 2016). Generally, past research found adolescents' exploration to be moderately to strongly stable over time, over an academic year (Negru-Subtirica et al., 2015; Pop et al., 2016) or a 3-year period (Germeijs, Verschueren, & Soenens, 2006). While some of these studies used analytical strategies considered to fall within a person-centred approach (i.e., LGCM, which allows the estimation of one or more growth patterns), they typically focused on a pattern of change that characterized the entire sample instead of identifying distinct developmental patterns. In addition, previous empirical studies examined a relatively short period in adolescents' vocational development, typically over an academic year. In these studies, the fact that variances of intercept (i.e., absolute level of exploration at a

given time) and slope (i.e., pattern of change in exploration between two measurement waves) were found to be statistically significant suggests that there were inter-individual differences in magnitude and patterns of change in vocational exploration. Given these distinct patterns of exploration – albeit over a short period – it is logical to expect subgroups of individuals to adopt different longitudinal patterns of exploration over a period of several years (i.e., to identify heterogeneous developmental trajectories of exploration).

Given the presence of distinct exploration trajectories, a subsequent step will be to predict trajectory group membership as a function of parental NSB. Among studies that examined predictors of changes in vocational exploration, the focus was mainly on the role of intrapersonal variables such as anxiety (Germeijs et al., 2006), vocational decision-making self-efficacy and self-concept (Guan et al., 2015; Guan et al., 2017), or involvement in career exploration tasks (Germeijs & Verschueren, 2006; 2009). With respect to the contribution of external variables, research on the contribution of parents has examined career-specific parental behaviors such as support, interference, and career engagement and found that children whose parents manifested high support and career engagement, as well as low interference, reported higher levels of vocational exploration (Guan et al., 2015). Some studies (e.g., Germeijs et al., 2006) also examined attachment security, which appears to be important with mothers, but unrelated with fathers.

#### 4. The present study

In this study, the overarching goal was to examine developmental trajectories of vocational exploration from mid-adolescence to emerging adulthood. A first objective was to identify and describe trajectories of vocational exploration, using a person-centred approach, while distinguishing between self and environment exploration. Specifically, we wanted to determine if vocational exploration develops in a homogeneous (i.e., the entire sample followed a unique trajectory, suggesting a uniform pattern of development) or heterogeneous fashion (i.e., more than one pattern of development, as revealed by several distinct developmental trajectories). With past studies showing (1) individual differences to be important predictors of the vocational exploration (i.e., vocational choices differing across individuals; Reed et al., 2004; Robitschek & Cook, 1999; Rogers et al., 2008; Dietrich, Kracke, & Nurmi, 2011; Guan et al., 2017; Guan et al., 2015), and (2) individual variations in intercepts and slopes of growth modeling (Germeijs et al., 2006; Germeijs & Verschueren, 2006; Negru-Subtirica et al., 2015; Pop et al., 2016), we expected to identify more than one trajectory of vocational exploration. At least one of these trajectories was expected to be increasing, in line with positive slopes obtained in past studies (i.e., Germeijs et al., 2006; Germeijs & Verschueren, 2006), and another to be more stable, in line with Pop et al.'s (2016) findings of a constant exploration slope. Another rationale for expecting distinct developmental patterns of exploration was the fact that students in our sample were expected to go through at least one school transition. In the Quebec education system, students who earn a secondary school diploma can continue their studies at the college level for two (pre-university, general training; e.g., social sciences) or three years (technical training; e.g., nursing) before entering university. These academic choices (e.g., college program, going to university or not, university program) are carried out with an eventual career in mind – for instance choosing a college program in science to enter an engineering program at the university level. Consequently, transition effects were expected, which in the context of longitudinal estimation entails points of rupture in developmental patterns when changes in vocational exploration occur. Because this study examines these patterns from a person-centred approach, it would be possible to identify a subgroup of students evidencing a more pronounced increase in exploratory behaviors when the transition approaches in order to make a vocational decision (e.g., going to university, therefore choosing a two-year pre-university program). Alternatively, some students might have already made a decision in secondary school and, having outlined an assorted training plan, report a sharp decrease in exploration.

The second objective of this study was to predict students' membership in each developmental trajectory as a function of parental NSB (i.e., autonomy support, structure, and involvement). Considering that NSB were found to positively predict adolescents' vocational exploration (Dietrich & Kracke, 2009; Niemiec et al., 2006; Singh et al., 1995; Soenens & Vansteenkiste, 2005), we expected higher levels of parental NSB to predict being in a high and/or an increasing trajectory, while lower levels of NSB would predict belonging to lower trajectories of vocational exploration. Analyses will consider the contribution of adolescents' gender (Blustein & Phillips, 1988; Blustein, 2006; Hardin et al., 2006; Russell et al., 2017) and other family characteristics (i.e., SES, family structure, and mother's education level) in predicting trajectory group membership given their association with the study's key variables. Parents from lower social economic strata have more difficulty in contributing to their children's vocational development because of a lack of information and opportunities to explore (Soresi, Nota, Ferrari, & Ginevra, 2014), which can result in lower levels of vocational exploration. With respect to family structure, differences were found between married and divorced families (Tucker, Barber, & Eccles, 2001), where children of divorced parents tended to have lower educational attainment than children from intact families (Amato, Rezac, & Booth, 1995). Finally, parents' education level could also account for differences in adolescents' commitment toward vocational exploration and academic achievement (Hahs-Vaughn, 2004; Kracke, 1997; Litalien & Guay, 2010), as adolescents tend to aim for a similar level of education as their parents (Dubow & Boxer, 2009; Wilson & Wilson, 1992).

#### 5. Method

##### 5.1. Participants and procedure

Data comes from a 6-year longitudinal study on vocational decision-making. Participants were selected from a stratified sample of 2500 adolescents enrolled in the third of the five years of high school (Secondary 3) during the 2011–2012 academic year, which was provided by the Quebec Ministry of Education. Adolescents and their parents were contacted by phone and invited to participate to

the study. A total of 1109 families agreed to participate, and consequently, an introductory letter and informed consent form were sent electronically or by mail. Upon receiving consent, adolescents and parents were asked to answer a questionnaire separately in paper or electronic format (via a secured server). Participants were surveyed each year in the fall semester and this study used data from 2011 (Time 1 [T1]; Secondary 3), 2012 (Time 2 [T2]; Secondary 4), 2013 (Time 3 [T3]; Secondary 5), 2014 (Time 4 [T4]; first post-secondary year), and 2015 (Time 5 [T5]; second post-secondary year). Specifically, the student data from T2 to T5 is used for estimating trajectories of vocational exploration (this variable was not measured in T1), and T1 data was used for parental NSB and family characteristics.

A total of 522 adolescents (55% girls;  $M_{\text{age}} = 14.2$  years,  $SD = 0.2$ ) were invited to complete a questionnaire in T1, and each fall for 6 years. Most of them were enrolled in a general education path (86%), which leads to college, 10% were in the work-oriented training path, and 3% were in the applied general education path, both leading to a more technical training. Most adolescents were born in the province of Quebec (93%), spoke French at home (98%) and grew up in a nuclear family (74%). The family income, as reported by mothers, was situated between \$60,000 and \$69,000 CAN, which concurs with the average household income in Quebec in 2011 (\$68,170 CAN; [Statistics Canada, 2013](#)). Most parents (94% of fathers and 96% of mothers) in the sample reported having earned at least a high school diploma, which characterizes their level of education as 'low risk' ([Duchesne, Larose, Vitaro, & Tremblay, 2010](#)).

## 5.2. Measures

### 5.2.1. Vocational exploration (T2 to T5)

Adolescents' vocational exploration was assessed with the Career Exploration Survey ([Stumpf et al., 1983](#)), which has been frequently used in adolescent high school samples by researchers in different countries, and demonstrated satisfying psychometric qualities (e.g., [Denault, Ratelle, Duchesne, & Guay, 2019](#); [Hirschi et al., 2011](#); [Jiang, Newman, Le, Presbitero, & Zheng, 2018](#); [Schmitt-Rodermund & Vondracek, 1999](#)). This multidimensional scale assessed *self-exploration* (e.g., I thought about my past school experiences and my career; 9 items;  $\alpha = 0.86$  to  $0.89$  across measurement waves) and *environment exploration* (e.g., I participated in various career guidance program; 6 items;  $\alpha = 0.85$  to  $0.89$ ). In this study, a back-translation procedure ([Vallerand, 1989](#)) was used to translate it into French. Participants were asked to indicate the extent to which they agreed with each item using a 5-point Likert scale (1 = not much or not at all, 5 = a lot). Because of the complexity of trajectory modeling to be carried with this measure, we first examined whether it was psychometrically sound by estimating measurement models (confirmatory factor analysis; CFA) with two latent factors (self and environment exploration; Model 1 in the Appendix) and second-order latent factor (*global exploration*, which included first-order factors of the previous model; Model 2). As reported in the Appendix, models yielded satisfying fit indices. The strength of correlations between latent factors in two-factor models ( $r_s = 0.47$  to  $0.71$ ) as well as the high factor loadings of first-order factors on the second-order exploration factors in secondary 4 ( $\lambda_s = 0.82$  and  $0.87$ ), secondary 5 ( $\lambda_s = 0.77$  and  $0.67$ ), first year of college ( $\lambda_s = 0.71$  and  $0.66$ ), and second year of college ( $\lambda_s = 0.66$  and  $0.82$ ) suggested that self and environment exploration form a unified factor. Hence, trajectory modeling was carried on global exploration scores. This concurs with previous studies that examined global vocation exploration in youth (e.g., [Cai et al., 2015](#); [Guan et al., 2017](#); [Kracke, 2002](#); [Li et al., 2015](#)). The Cronbach  $\alpha$  values for this unidimensional scale ranged from 0.88 to 0.92 across measurement waves.

### 5.2.2. Perceived parental NSB

Parental *autonomy support* was assessed with the Perceived Parental Autonomy Support Scale ([Mageau et al., 2015](#)), which assesses several manifestations of autonomy support such as providing a rationale for required behaviors, taking the adolescents' perspective, and offering opportunities for choice. Participants had to indicate the extent to which they agreed with each item using a 7-point Likert scale (1 = do not agree at all, 7 = strongly agree). Items assessing adolescents' perceptions of autonomy support received from their parents (12 items) focused on provision of choice within certain limits, rationale for demands and limits, and acknowledgment of feelings. The psychometric qualities of this scale were supported in the validity study ( $\alpha =$  between 0.89 and 0.94; [Mageau et al., 2015](#)), in past research ( $\alpha =$  between 0.91 and 0.93; [Ratelle, Duchesne, & Guay, 2017](#)), and in this study ( $\alpha = 0.93$ ). Parental *structure* was assessed using the Multidimensional Structure Scale ([Ratelle et al., 2018](#)). Whereas past studies on parental structure used a unidimensional approach to assess structure, this scale is based on a multidimensional conceptualization of structure ([Farkas & Grolnick, 2010](#)), which provides a rich coverage of this NSB. Participants indicated the extent to which each item corresponded to their relationship with their parents using a 5-point Likert scale that ranged from 1 (never or almost never) to 5 (always or almost always). A sample item is "My parents tell me when I don't respect a family rule" (20 items). This scale was found to possess acceptable psychometric qualities in past research ( $\alpha =$  between 0.85 and 0.86; [Ratelle et al., 2017](#)) and in this study ( $\alpha = 0.88$ ). Finally, parental *involvement* was assessed with the Acceptance versus Rejection subscale of the Children's Report on Parent Behavior Inventory ([Schaefer, 1965](#)), which was translated into French using a back-translation procedure ([Vallerand, 1989](#)). Adolescents rated 10 items on a 5-point scale ranging from 1 (totally in disagreement) to 5 (totally in agreement). A sample item was "My parents help me feel better when I discuss my concerns with them" ( $\alpha = 0.93$ ). This scale has been frequently used by researchers around the world (e.g., [Farkas & Grolnick, 2010](#); [Wu & Chao, 2011](#)) and past research supported its psychometric qualities (e.g.,  $\alpha = 0.81$  [Farkas & Grolnick, 2010](#);  $\alpha =$  between 0.82 and 0.89; [Ratelle et al., 2017](#)).

### 5.2.3. Sociodemographic and control variables

At T1, adolescents reported on their gender and parents provided information on their marital status, family income, and highest level of education. As mentioned above, these variables are known to explain some variance in vocational exploration or parental

NSB. Previous studies (e.g., Duchesne et al., 2010; Duchesne, Vitaro, Larose, & Tremblay, 2008; Rumberger, 1983; Vitaro, Brendgen, Larose, & Tremblay, 2005) have used a *Sociofamilial Adversity Index* – a score that combines important sociodemographic variables such as the ones identified in this study – to parsimoniously control for their contribution in a complex model. This score was used to study academic achievement as well as vocational outcomes (e.g., college completion; Larose, Duchesne, Boivin, Vitaro, & Tremblay, 2015) and has been linked with parenting behaviors (Duchesne et al., 2008; Vitaro et al., 2005). The *Sociofamilial Adversity Index* incorporates measures of maternal education level, family income, and family structure (being in an intact vs. not intact family). Each of these variables (maternal education, family income, and family structure) is conceptualized in terms of risk and binarized, as 0 (not at risk) or 1 (at risk). Hence, maternal education level was scored as either 1 (mothers earning less than a high school diploma; 24% or the sample) or 0 (having at least a high school diploma; 76% or the sample). Family income was scored as either 1 (annual income lower than \$29,000 CAN for a family of four; 30% or the sample) or 0 (annual income higher than \$29,000 CAN; 70% or the sample), and family structure as either 1 (not intact; e.g., parents separated, divorced, widowed; 36% or the sample) or 0 (having an intact family; 64% or the sample). These binary variables were then averaged to create our sociofamilial adversity index, giving a score between 0 and 1. Most of the sample (44%) was considered not at risk (i.e., score of 0), and 6% were considered highly at risk (score of 1).

### 5.3. Statistical analyses

#### 5.3.1. Missing data

A longitudinal research design inevitably entails missing data across measurement waves. There were initially 522 adolescents in the sample and, because participants could miss data waves across the study, missing data rates varied across times (from 27% at T1 to 45% at T5). To avoid the loss of statistical power and reduce bias a listwise deletion would induce, the missing data was estimated using full-information maximum likelihood (FIML) estimation (Enders, 2010; Graham, 2009). To estimate developmental trajectories of exploration, only participants who completed a minimum of two data waves out of the possible four (i.e., T2 to T5) were included, yielding a sample of 348. We also performed a bootstrap statistical inference fixed at 1000 to test the model in several resamples.

#### 5.3.2. Trajectories analyses

To estimate heterogeneous development of vocational exploration, trajectory analyses were performed with Mplus (version 7; Muthén & Muthén, 2008–2012) using participants' vocational exploration scores from T2 to T5. Three distinct parameterizations were tested, as suggested by Morin and his colleagues (Morin et al., 2011): 1) general growth mixture analysis (GGMA) with Mplus defaults parameters (GGMA-MD; intercept and slope freed), 2) GGMA model with freely estimated latent variance-covariance matrices in all classes (GGMA-LV; intercept free, slope fixed at 0), and 3) latent growth curve analysis (LGCA; both intercept and slope fixed at 0). For each approach, we performed analyses with two to four trajectory classes of vocational exploration. The choice of an optimal model was based on the lowest Bayesian Information Criterion (BIC; Nagin, 2005) and the higher Entropy score (i.e., the probability of being classified in the adequate pattern; Morin et al., 2016), a statistically significant  $p$  value on the Vuong-Lo-Mendell-Rubin-Likelihood Ratio Test (VLMR), the Lo-Mendell-Rubin Adjusted (LMR-A), and the Bootstrapped Likelihood Ratio Test (BLRT), which indicates that a solution with a  $k$  number of groups was better than the  $k-1$  solution (Nylund, Asparouhov, & Muthén, 2007). In a second step, the number of distinct developmental patterns, the number of participants in each trajectory group, the shape of each trajectory (i.e., constant, linear, or quadratic), and the probability of belonging to the assigned trajectory were estimated.

#### 5.3.3. Predicting trajectory group membership

To predict trajectory group membership using parental NSB as independent variables, binary logistic regression analyses were performed in Mplus, which allows identifying the best predictors of trajectory group membership and determining the meaning of obtained associations. Trajectory group membership was coded in a binary format where 0 is the category of reference and 1 is the probability of belonging to the target groups. The yielded odds ratios (OR) are interpreted as a probability of belonging or not to the target group (1) where values below 1 indicate that the variable undermines the probability of belonging to the target group and values above 1 indicate that the variable increases the probability of being in the target group. Since logistical regression analyses require the absence of multicollinearity between predictors to be performed, and that parental NSB were highly correlated with each other (see Table 1), a parental NSB latent factor was created with autonomy support, structure and involvement factors to predict trajectory group membership. Gender and the sociofamilial adversity index were used as control variables.

## 6. Results

### 6.1. Preliminary analyses

First, the data was inspected to ensure it satisfied basic statistical assumptions. Some univariate outliers were identified and brought back within three standard deviations from the mean (see Tabachnick & Fidell, 2013). Second, we examined gender differences, which revealed dissimilarity on several measures. Bivariate analyses indicated that girls reported higher levels of vocational exploration ( $M_{\text{explorationT3}} = 3.44$  [2.55, 4.33];  $M_{\text{explorationT4}} = 3.40$  [2.56, 4.24]) than boys ( $M_{\text{explorationT3}} = 3.23$  [2.47, 3.99];  $M_{\text{explorationT4}} = 3.12$  [2.21, 4.03]) at T3 ( $F[295] = 0.28$ ,  $p = .02$ ,  $\eta^2 = 0.02$ ) and T4 ( $F[193] = 0.31$ ,  $p = .03$ ,  $\eta^2 = 0.02$ ).

Correlations among variables of the study were examined for the entire sample (see Table 1). With respect to scores of vocational exploration, which are to be used in the estimation of trajectories, correlational coefficients across the four measurement waves were

**Table 1**  
Correlations among variables, means, and standard deviations (N = 348).

	1	2	3	4	5	6	7	8	9
1. Gender	–								
2. Family risk	0.06	–							
3. Autonomy support <sup>a</sup>	–0.03	–0.14*	–						
4. Involvement <sup>b</sup>	–0.04	–0.15*	0.80*	–					
5. Structure <sup>b</sup>	–0.05	–0.09	0.75*	0.73*	–				
6. Vocational exploration. T2 <sup>b</sup>	0.11	0.11	0.11	0.04	0.15*	–			
7. Vocational exploration. T3 <sup>b</sup>	0.13*	0.04	–0.03	–0.03	0.08	0.44*	–		
8. Vocational exploration. T4 <sup>b</sup>	0.16*	0.01	0.15	0.05	0.11	0.40*	0.48*	–	
9. Vocational exploration. T5 <sup>b</sup>	0.02	0.14	–0.06	–0.07	0.03	0.39*	0.47*	0.52*	–
M	1.54	0.08	5.41	4.15	3.92	2.99	3.34	3.29	3.29
SD	0.50	0.15	0.08	0.69	0.56	0.90	0.83	0.87	0.87

Note.

<sup>a</sup> Used a 7-point scale.

<sup>b</sup> Used a 5-point scale.

\*  $p < .05$ .

moderate to strong, suggesting distinct patterns of change. Parental NSB were positively, albeit weakly, associated with exploration, which might indicate that there are heterogeneous exploration trajectories. Finally, gender and sociofamilial adversity were slightly associated with parental NSB and vocational exploration, which justifies their inclusion as control variables in prediction analyses.

### 6.2. Identifying distinct trajectories of vocational exploration

Models with two to four exploration trajectories were estimated using the three distinct parameterizations mentioned above. Models based on GGMA-MD and GGMA-LV were eliminated because they did not respect statistical postulates and generated negative variances. Table 2 presents fit indices for the LGCA method. Based on these fit indices, a 3-group solution was deemed optimal, compared to 2-group and 4-group models. The first group (6% of the sample) was labelled “Low and Stable” and included adolescents who reported exploration levels that were stable and low across the four years. The second trajectory (61% of the sample) was labelled “Moderately High and Increasing” and included adolescents whose exploration levels were initially slightly below average, increased until T4, and decreased at T5. Linear and quadratic parameters were statistically significant ( $ps < .05$ ). The third trajectory (33% of the sample) was labelled “High and Increasing” and included adolescents whose initial exploration level was above average and increased over time (see Fig. 1). Linear and quadratic parameters were statistically significant ( $ps < .05$ ).

#### 6.2.1. Gender differences

Once trajectories were identified, a 2 (boys vs. girls) X 3 (trajectory group membership) chi-square analysis was conducted to determine whether the distribution of boys and girls was similar in each trajectory group. Results suggested that gender distribution differed across trajectory groups ( $\chi^2 [2] = 7.40, p = .03$ ). Specifically, while there were about as many boys and girls in Low and Stable (50% girls) and Moderately High and Increasing (49% girls) trajectories, there seem to be more girls (64%) in the High and Increasing trajectory.

### 6.3. Predicting developmental trajectories of vocational exploration

Two binary logistical regression analyses were performed to examine the contribution of parental NSB in predicting membership in trajectories of vocational exploration, using gender and sociofamilial adversity as control variables. Contrasts between trajectory groups were tested by considering the High and Increasing trajectory as the reference group because of its highest developmental level of vocational exploration. Two models were tested, one comparing membership probabilities for Low and Stable (vs. reference trajectory; Model 1) and another for Moderately High and Increasing (vs. reference trajectory; Model 2; see Table 3).

**Table 2**  
Results of latent class analyses.

Number of groups	N by group	BIC	Entropy	VLRM <i>p</i> value	LRM-A <i>p</i> value	BLRT <i>p</i> value
2	205; 143	2391.59	0.623	.00	.00	.00
3	22; 213; 113	2377.05	0.654	.01	.01	.00
4	171; 59; 92; 26	2387.61	0.617	.25	.28	.02

Note. BIC = Bayesian information criteria; SSA BIC = Sample-Size Adjusted BIC; VLMR = Vuong-Lo-Mendell-Rubin-likelihood ratio test; LMR-A = Lo Mendell-Rubin adjusted LRT test; BLRT = Bootstrapped likelihood ratio test.

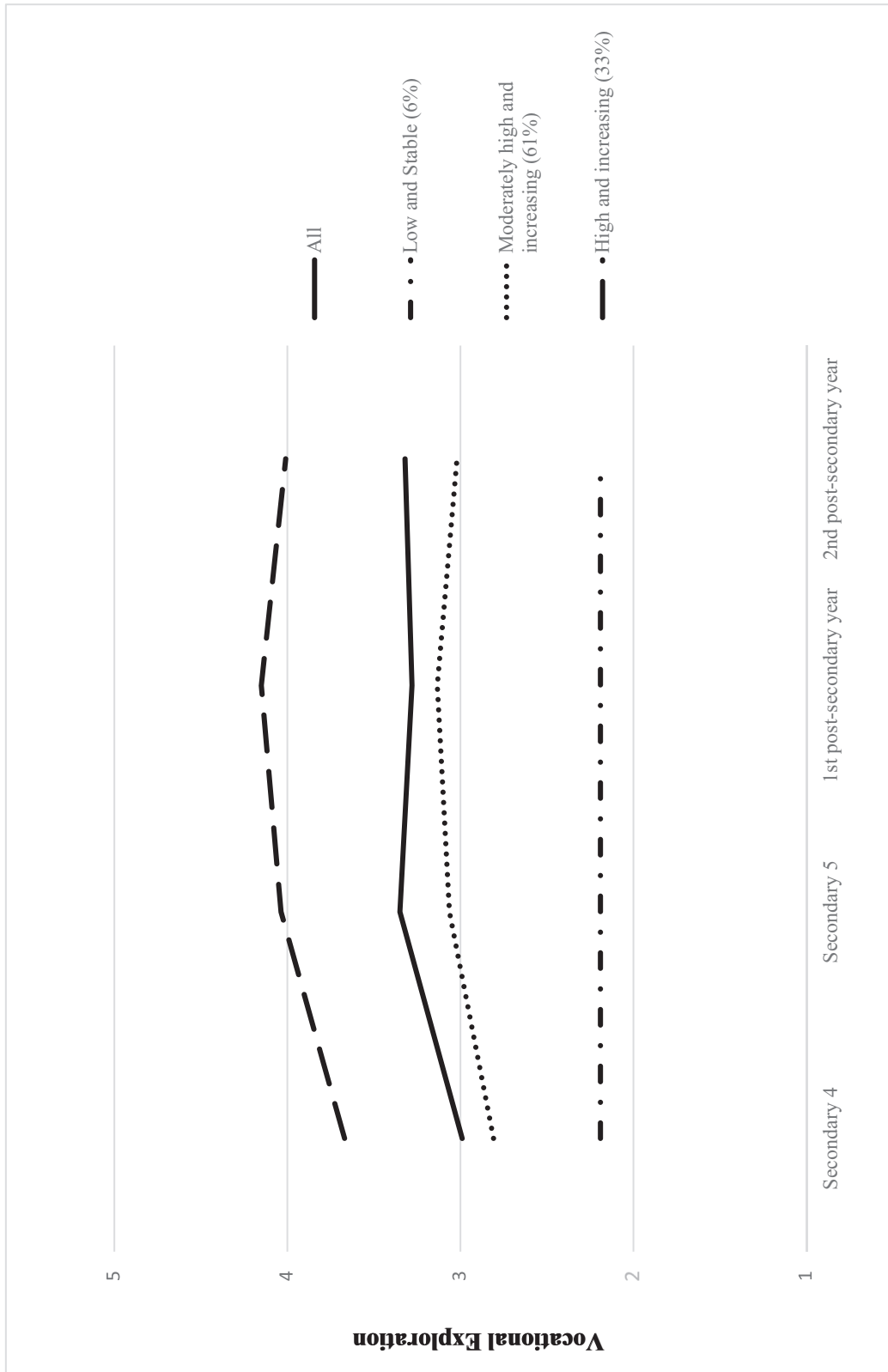


Fig. 1. Trajectories of vocational exploration (N = 348).



**Table 3**  
Results from logistic regressions predicting trajectory group membership ( $N = 348$ ).

	Wald	SE	OR	95% CI	p	R <sup>2</sup>
Model 1: Low (vs. high increasing)						
Sex <sup>a</sup>	-1.91	0.25	0.52	[0.20, 1.34]	.00	0.16
Sociofamilial Adversity Index <sup>b</sup>	-33.18	0.03	0.01	[0.00, 1.28]	.06	
Parental NSB	-1.13	0.19	0.78	[0.49, 1.26]	.26	
Model 2: Moderate (vs. high increasing)						
Sex <sup>a</sup>	-1.91	0.25	0.52	[0.32, 0.84]	.00	0.05
Sociofamilial Adversity Index <sup>b</sup>	-33.18	0.03	0.53	[0.11, 2.48]	.25	
Parental NSB	-1.13	0.19	0.82	[0.62, 1.08]	.11	

Note. NSB = need supporting behaviors.

<sup>a</sup> 0 = boy and 1 = girl.

<sup>b</sup> Higher scores means higher adversity.

### 6.3.1. Model 1

The results of a binary logistic regression analysis indicated that high levels of parental NSB decreased the probability of being in the Low and Stable trajectory (OR = 0.78), suggesting that parents of adolescents in the High and Increasing trajectory were perceived by their child as behaving in a more need supporting fashion (i.e., being more autonomy supportive, involved, and structuring) than those of adolescents in the Low and Stable trajectory. These findings controlled for gender and sociofamilial adversity, where the probability of belonging to the most negative trajectory (i.e., Low and Stable) was lower for girls (OR = 0.53) and for students with high sociofamilial adversity (OR = 0.01), the latter finding being unexpected.

### 6.3.2. Model 2

The results of this second binary logistic regression analysis indicated that parental NSB decreased the probability of being in the Moderately High and Increasing trajectory, suggesting that adolescents in the High and Increasing trajectory perceived their parents as more supportive of their psychological needs (OR = 0.80) than those in the Moderately High and Increasing trajectory. As for the previous analysis, the contribution of gender and sociofamilial adversity were controlled for and yielded similar results (i.e., membership in the Moderately High and Increasing trajectory was more probable for boys [OR = 0.52] and adolescents at lower sociofamilial adversity [OR = 0.53]).

Together, findings from Model 1 and 2 suggest that the High and Increasing trajectory included adolescents who 1) perceived stronger NSB from their parents, 2) were mostly girls, and 3) had higher levels of sociofamilial adversity (i.e., lower-income families, where mothers had a lower level of education, and parents had separated or divorced).

## 7. Discussion

This longitudinal study aimed to identify developmental trajectories of youth's vocational exploration from mid-adolescence to emerging adulthood from a person-centred approach (i.e., assuming heterogeneous development). To our knowledge, this is the first study that examined this important vocational task using a truly developmental approach with appropriate analytical tools (i.e., LCGA). Over a four-year period, distinct exploration trajectories were identified in our sample, illustrating the necessity to study vocational exploration as a developmental task that evolves differently across subsamples of individuals. Furthermore, anchored in an organismic dialectical approach, this study examined how the interpersonal environment provided by parents could support the unfolding of youth's inner resources. Specifically, SDT offers a richer theoretical framework to understand youth's vocational exploration as a function of supportive behaviors (i.e., autonomy support, involvement, and structure – which are important for youth's psychological need satisfaction). As expected, the present study identified distinct developmental trajectories of vocational exploration from mid-adolescence to early adulthood, illustrating how youth's vocational exploration unfolds differently over time for different subgroups of individuals. Three distinct developmental patterns were identified: A first developmental pattern characterized a third of the sample and included youth reporting high levels of exploration that increased over time (High and Increasing trajectory). Another developmental pattern, which included most of the sample, included youth whose initial level of exploration was moderate and increased over time and then decreased slightly (Moderately High and Increasing trajectory). Finally, a third developmental pattern, characterized by low levels of exploration that remained stable across the studied period (Low and Stable), included a minority of adolescents. The highest trajectory (i.e., High and Increasing), because of its higher vocational exploration level, was used as the reference trajectory to compare others. Results revealed that belonging to this trajectory was more likely if adolescents perceived their parents to behave in a manner that was highly supportive of their psychological needs (i.e., by being autonomy supportive, involved, and structuring). Results also showed that this trajectory was more characteristic of girls and of adolescents with low maternal education, lower family income and unstable family structure, which are all typically associated with high risk environments for adolescents. These findings have important implications for theories, research, and interventions on adolescents' vocational development, discussed in the next section.

### 7.1. Implications for vocational development theories

A first implication pertains to the importance of examining vocational exploration in a truly longitudinal fashion, which previous reviews have called for numerous times without receiving tangible results (see Oliveira, Porfeli, & Taveira, 2017). As underlined by Gati (2013), career development is a continuous process that involves seeking, obtaining, and processing information about oneself and one's environment. The present findings highlight the necessity to consider the developmental nature of vocational exploration and demonstrate that the continuous nature of this vocational process is not necessarily linear. Furthermore, the obtained results showed that youths' exploration does not evolve in a uniform fashion. This element concurs with Super's (1953) vocational development theory, which postulated that vocational development is not homogeneous. His theory further proposed that differences in vocational development are a function of individual characteristics such as personality and interests. One such characteristic is gender, and in this study, trajectory group membership varied according to gender. Specifically, girls were more often found in the highest trajectory of vocational exploration, in line with previous findings that girls were more involved in vocational exploration than boys (Gamboa, Paixão, & de Jesus, 2013; Kracke & Schmitt-Rodermund, 2001; Lazarides, Rohowski, Ohlemann, & Ittel, 2016). Concretely, this gender difference can be manifested by a more sustained exploration, where girls carefully prepare their career plan, as expected in previous studies (Negru-Subtirica et al., 2015; Patton et al., 2004). In practice, counselors could anticipate the guidance process to be longer with girls than boys, since boys were found to take unplanned decisions (Luzzo, 1995). It can also prompt them to devote targeted attention to boys as a way to prevent such impulsive decision-making.

A second related contribution of this study involves the shapes of obtained exploration trajectories. Several developmental trajectories were identified and they evidenced distinct shapes, some of which indicated to be quadratic (i.e., revealing the existence of breaking points on the latent curve). This suggests that vocational development – here considered from the standpoint of exploration activities – has not only increasing stages as previous research has indicated (Hirschi, 2011), but also decreasing ones. Over a four-year period, two trajectories have undergone different stages of growth, have peaked, and have finally declined, demonstrating development through different stages, rather than the presence of a single process. It implies that an important aspect of vocational development observed in this study, youth's vocational exploration, is not constant and has phases of varying lengths and intensities, instead of one unique choice. Yet, the possibility that vocational development might be a unique choice was partly supported in one trajectory that found exploration to be constant during this same period. In practice, this can be explained by adolescents who already made a career choice at a younger age, as a vocation (e.g., a child who dreamed of becoming a police officer as his or her father since childhood; a youth who grew up on a farm and wanted to become a veterinarian to save animals according to family values). However, the proportion of people in this trajectory was very small (6% of the sample) and must be interpreted with caution. Nevertheless, these different developmental patterns echo past propositions that career decision-making rests on abilities and preferences that are likely to vary over time and life experiences (Super, 1953).

### 7.2. Implications related to parents' contribution to vocational exploration

Another contribution of this study involves the role of supportive parental behaviors for their children's vocational development, and in this case exploration. Contextual and systems career perspectives (e.g., Patton & McMahon, 2014) situated vocational decision-making at the intersect of youth's inner processes and their social context. However, research and theories devoted a lot of attention to the role of attachment styles and to the influence of parental aspirations (Liu & McMahon, 2017; Wright & Perrone, 2008). Our findings demonstrated the utility of adopting a need-based framework, anchored in SDT, to understand how parents can support their children's vocational development through their exploration of themselves and their environment. Previous studies supported the importance of parental NSB for adolescents' development (Ryan & Deci, 2017), be it their well-being, academic, or vocational development (Bartley & Robitschek, 2000; Cordeiro et al., 2015; Crocetti et al., 2016; Hirschi et al., 2015; Kracke, 2002; Moreau & Mageau, 2013; Pop et al., 2016). There is also evidence that parental behaviors that thwart adolescents' psychological needs can undermine their exploration behaviors (Vignoli, Croity-Belz, Chapeland, de Fillipis, & Garcia, 2005). Adopting a longitudinal approach, the present findings suggest that parental NSB predict adolescents' developmental trajectory of vocational exploration. Hence, when parents demonstrated high levels of autonomy support, involvement, and structure in their interactions with youth, it increased the probability of them reporting high and increasing levels of vocational exploration from mid-adolescence to early adulthood. It is important to note that parental NSB were a more distal predictor of youth's developmental trajectories in our research design, having been assessed while adolescents were in secondary 3 while trajectories were estimated in the following 4 years. We would thus expect to find even stronger contribution of parental NSB if these had been considered as time-varying predictors across these years.

In line with SDT, the contribution of parental NSB to the development of their child's vocational exploration would be a function of more proximal determinants of adolescents' vocational exploration, namely adolescents' motivational processes (i.e., psychological need satisfaction, autonomous motivations; Ryan & Deci, 2017). When parents support their children's autonomy, demonstrate high involvement, and are structuring, they contribute to the satisfaction of their children's psychological needs for autonomy, competence, and relatedness (see Ratelle & Duchesne, 2017). Psychological need satisfaction will, in turn, allow youth to mobilize their resources and regulate their behaviors in an autonomous (vs. controlled) fashion, which is important for a host of positive adolescents' outcomes such as vocational decision-making. This interpretation is consistent with past studies that found youths to be more autonomously regulated (e.g., engaging in vocational exploration tasks by interest, or because they recognize the importance to prepare a career plan) when they perceived important individuals as autonomy supportive and when their psychological needs were satisfied (Guay, Ratelle, Larose, Vallerand, & Vitaro, 2013; Ryan & Deci, 2017). Future research is nevertheless needed to support the

mediating role of youth's motivational resources in the relation from parental NSB to vocational exploration.

Family characteristics (i.e., family structure, SES, and parents' education levels) also predicted trajectory group membership. A counterintuitive finding was obtained where the lowest pattern of vocational exploration (i.e., Stable and Low) was best predicted by a lower sociofamilial adversity. These findings contrast with those of past studies that found adolescents living in wealthier families to explore more than adolescents from lower socioeconomic strata – who are typically provided with fewer opportunities to explore (Schulenberg, Vondracek, & Crouter, 1984; Soresi et al., 2014; Terenzini, Springer, Yaeger, Pascarella, & Nora, 1996; Tucker et al., 2001). This might indicate a tendency to reproduce the social model one is exposed to, where academic or professional aspirations emerge from socialization, and through family characteristics (Bradley & Corwyn, 2002; Dubow & Boxer, 2009; HRSDC, 2004; Wilson & Wilson, 1992). Hence, adolescents from families characterized by higher education and socioeconomic advantages may have fewer vocational doubts and a weaker need to explore vocational opportunities. The high trajectory also yielded counterintuitive findings. In the past, adolescents from lower social economic strata were found to experience more difficulties in exploring because of a lack of information and opportunities (Liu & McMahon, 2017; Soresi et al., 2014). Those socioeconomic barriers also generate more personal responsibility and effort to succeed (Albien & Naidoo, 2018). Here, the opposite was found, which may be induced by the search for financial stability: the need for financial security puts these adolescents in a position where they need to be exploring much more to find ways to achieve their career goals. Possibly, adolescents with higher sociofamilial adversity have more diversified academic or professional aspirations than adolescents from wealthier families, leading the former to consider professional training or collegiate degrees, rather than university degrees (more typical in adolescents from wealthier families; HRSDC, 2004).

### 7.3. Strengths, limits, and future research

Despite its numerous strengths (e.g., person-centred approach, longitudinal design, sophisticated trajectory modeling, a stratified sample provided by the Ministry of Education), some limits must be considered when interpreting the findings herein obtained. First, measures were self-reported and, consequently, subject to social desirability bias and shared method variance. Future research could therefore consider using other informants on measures of parental behaviors such as parents themselves or siblings. Second, it is not possible to infer causal relationships between variables of the study given the descriptive (i.e., non-experimental) nature of our research design. Finally, considering that adolescents in our sample were predominantly Caucasian, French speaking, and from middle-class, we must be careful to generalize the present study to an entire population until replication is provided. For example, it would be relevant to study vocational exploration with younger or older adolescents, youth from more diversified socioeconomic strata, or adolescents from other cultures.

In future research, we suggest studying the predictive utility of adolescents' vocational exploration trajectories for their personal characteristics (e.g., vocational identity, career indecision, career choice anxiety, academic achievement) as well as examine the academic or professional choices resulting from exploration trajectories. According to SDT, youth whose parents support their psychological needs behave in a more autonomous way and in concordance with their authentic self. As a result, we could expect these youth – whom we found to be more likely to explore in a high and increasing fashion – to have a clearer vocational identity, to be more decided, and to make a career choice based on their intrinsic interests. Hence, the identification of heterogeneous exploration trajectories is innovative and provides valuable longitudinal information on this important vocational task but testing their predictive power will also be of prime importance. Another important avenue of investigation is the time-varying role of parental behaviors. Future research should examine the longitudinal contribution of parental NSB during vocational development to better delineate their importance.

## 8. Conclusion

This research demonstrated that youth's vocational exploration follows distinct developmental trajectories from mid-adolescence to emerging adulthood and that a pattern characterized by higher and increasing levels of exploration was more likely (1) when parents supported the satisfaction of their children's psychological needs, (2) in girls, and (3) in adolescents exposed to higher sociofamilial adversity. While family characteristics are more difficult to modify than specific behaviors, interventions should aim to increase parental NSB, and hopefully diminishing the intake of family characteristics by increasing adolescents' opportunities for exploration. One strategy would be for educational services branch and education professionals to involve parents in educational and vocational development by encouraging the adoption of NSB and reducing the use of behaviors that thwart adolescents' psychological needs satisfaction (e.g., control, rewards, punishments). Another strategy would be to modify the high school curriculum to include activities that foster self and environment exploration.

## References

- Albien, A. J., & Naidoo, A. V. (2018). Barriers and enablers for career development among marginalized South African youth. In V. Cohen-Scali, & J. Rossier (Eds.). *New perspectives on career counseling and guidance in Europe* (pp. 147–165). Cham: Springer.
- Amato, P. R., Rezac, S. J., & Booth, A. (1995). Helping between parents and young adult offspring: The role of parental marital quality, divorce, and remarriage. *Journal of Marriage and the Family*, 57(2), 363–374.
- Barnard, W. M. (2004). Parent involvement in elementary school and educational attainment. *Children and Youth Services Review*, 26(1), 39–62.
- Bartley, D. F., & Robitschek, C. (2000). Career exploration: A multivariate analysis of predictors. *Journal of Vocational Behavior*, 56(1), 63–81.
- Blau, P. M., Gustad, J. W., Jessor, R., Parnes, H. S., & Wilcock, R. C. (1956). Occupational choice: A conceptual framework. *ILR Review*, 9(4), 531–543.
- Blustein, D.I. (2006). *The Psychology of Working: A New Perspective for Career Development, Counseling, and Public Policy*. Mahwah, NJ: Lawrence Erlbaum Associates.

- Blustein, D. L., & Phillips, S. D. (1988). Individual and contextual factors in career exploration. *Journal of Vocational Behavior*, 33(2), 203–216.
- Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology*, 53(1), 371–399.
- Bryant, B. K., Zvonkovic, A. M., & Reynolds, P. (2006). Parenting in relation to child and adolescent vocational development. *Journal of Vocational Behavior*, 69(1), 149–175.
- Cai, Z., Guan, Y., Li, H., Shi, W., Guo, K., Liu, Y., & Hua, H. (2015). Self-esteem and proactive personality as predictors of future work self and career adaptability: An examination of mediating and moderating processes. *Journal of Vocational Behavior*, 86, 86–94.
- Chiesa, R., Massei, F., & Guglielmi, D. (2016). Career decision-making self-efficacy change in Italian high school students. *Journal of Counseling & Development*, 94(2), 210–224.
- Cordeiro, P. M., Paixão, M. P., Lens, W., Lacante, M., & Luyckx, K. (2015). Cognitive–motivational antecedents of career decision-making processes in Portuguese high school students: A longitudinal study. *Journal of Vocational Behavior*, 90, 145–153.
- Creed, P. A., Patton, W., & Prideaux, L.-A. (2007). Predicting change over time in career planning and career exploration for high school students. *Journal of Adolescence*, 30(3), 377–392.
- Crocetti, E., Van der Graaff, J., Moscatelli, S., Keijsers, L., Koot, H. M., Rubini, M., Meeus, W., & Branje, S. (2016). A longitudinal study on the effects of parental monitoring on adolescent antisocial behaviors: The moderating role of adolescent empathy. *Frontiers in Psychology*, 7, 1726.
- Denault, A. S., Ratelle, C. F., Duchesne, S., & Guay, F. (2019). Extracurricular activities and career indecision: A look at the mediating role of vocational exploration. *Journal of Vocational Behavior*, 110, 43–53.
- Dietrich, J., & Kracke, B. (2009). Career-specific parental behaviors in adolescents' development. *Journal of Vocational Behavior*, 75(2), 109–119.
- Dietrich, J., Kracke, B., & Nurmi, J.-E. (2011). Parents' role in adolescents' decision on a college major: A weekly diary study. *Journal of Vocational Behavior*, 79, 134–144.
- Dubow, E. F., & Boxer, P. (2009). Long-term effects of parents' education on children's educational and occupational success: Mediation by family interactions, child aggression, and teenage aspirations. *Merrill-Palmer Quarterly: Journal of Developmental Psychology*, 55(3), 224–249.
- Duchesne, S., Larose, S., Vitaro, F., & Tremblay, R. E. (2010). Trajectories of anxiety in a population sample of children: Clarifying the role of children's behavioral characteristics and maternal parenting. *Development and Psychopathology*, 22(2), 361–373.
- Duchesne, S., Vitaro, F., Larose, S., & Tremblay, R. E. (2008). Trajectories of anxiety during elementary-school years and the prediction of high school noncompletion. *Journal of Youth and Adolescence*, 37(9), 1134–1146.
- Enders, C. K. (2010). *Applied missing data analysis*. New York, NY: Guilford.
- Farkas, M. S., & Grolnick, W. S. (2010). Examining the components and concomitants of parental structure in the academic domain. *Motivation and Emotion*, 34(3), 266–279.
- Flum, H. (2001). Relational dimensions in career development. *Journal of Vocational Behavior*, 59(1), 1–16.
- Gamboa, V., Paixão, M. P., & de Jesus, S. N. (2013). Internship quality predicts career exploration of high school students. *Journal of Vocational Behavior*, 83(1), 78–87.
- Gati, I. (2013). Advances in career decision making. In W. B. Walsh, M. L. Savickas, & P. J. Hartung (Eds.), *Handbook of vocational psychology: Theory, research, and practice* (pp. 183–215). New York, NY: Routledge/Taylor & Francis.
- Germeijs, V., & Verschueren, K. (2006). High school students' career decision-making process: A longitudinal study of one choice. *Journal of Vocational Behavior*, 68(2), 189–204.
- Germeijs, V., Verschueren, K., & Soenens, B. (2006). Indecisiveness and high school students' career decision-making process: Longitudinal associations and the mediational role of anxiety. *Journal of Counseling Psychology*, 53(4), 397–410.
- Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology*, 60, 549–576.
- Grolnick, W. S., Raftery-Helmer, J. N., Marbell, K. N., Flamm, E. S., Cardemil, E. V., & Sanchez, M. (2014). Parental provision of structure: Implementation and correlates in three domains. *Merrill-Palmer Quarterly*, 60(3), 355–384.
- 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., & Slowiaczek, M. L. (1994). Parents' involvement in children's schooling: A multidimensional conceptualization and motivational model. *Child Development*, 65(1), 237–252.
- Guan, Y., Wang, F., Liu, H., Ji, Y., Jia, X., Fang, Z., & Li, C. (2015). Career-specific parental behaviors, career exploration and career adaptability: A three-wave investigation among Chinese undergraduates. *Journal of Vocational Behavior*, 86, 95–103.
- Guan, Y., Zhuang, M., Cai, Z., Ding, Y., Wang, Y., Huang, Z., & Lai, X. (2017). Modeling dynamics in career construction: Reciprocal relationship between future work self and career exploration. *Journal of Vocational Behavior*, 101, 21–31.
- Guay, F., Ratelle, C., Larose, S., Vallerand, R. J., & Vitaro, F. (2013). The number of autonomy-supportive relationships: Are more relationships better for motivation, perceived competence, and achievement? *Contemporary Educational Psychology*, 38(4), 375–382.
- Guay, F., Sénéchal, C., Gauthier, L., & Fernet, C. (2003). Predicting career indecision: A self-determination theory perspective. *Journal of Counseling Psychology*, 50(2), 165.
- Gushue, G. V., Scanlan, K. R., Pantzer, K. M., & Clarke, C. P. (2006). The relationship of career decision-making self-efficacy, vocational identity, and career exploration behavior in African American high school students. *Journal of Career Development*, 33(1), 19–28.
- Hahs-Vaughn, D. (2004). The impact of parents' education level on college students: An analysis using the beginning postsecondary students longitudinal study 1990–92/94. *Journal of College Student Development*, 45(5), 483–500.
- Hardin, E. E., Varghese, F. P., Tran, U. V., & Carlson, A. Z. (2006). Anxiety and career exploration: Gender differences in the role of self-construal. *Journal of Vocational Behavior*, 69(2), 346–358.
- Hartung, P. J., Porfeli, E. J., & Vondracek, F. W. (2005). Child vocational development: A review and reconsideration. *Journal of Vocational Behavior*, 66, 385–419.
- Hill, N. E., & Taylor, L. C. (2004). Parental school involvement and children's academic achievement: Pragmatics and issues. *Current Directions in Psychological Science*, 13(4), 161–164.
- Hirschi, A. (2011). Career-choice readiness in adolescence: Developmental trajectories and individual differences. *Journal of Vocational Behavior*, 79(2), 340–348.
- Hirschi, A., Abessolo, M., & Froidevaux, A. (2015). Hope as a resource for career exploration: Examining incremental and cross-lagged effects. *Journal of Vocational Behavior*, 86, 38–47.
- Hirschi, A., Niles, S. G., & Akos, P. (2011). Engagement in adolescent career preparation: Social support, personality and the development of choice decidedness and congruence. *Journal of Adolescence*, 34(1), 173–182.
- Human Resources and Skills Development Canada (2004). *Les aspirations des jeunes Canadiens à des études avancées, rapport final*. Retrieved at <http://www.hrsdc.gc.ca/fr/sm/ps/rhdcc/pa/publications/2004-002631/sp-600-05-04.pdf>.
- Jeynes, W. H. (2005). A meta-analysis of the relation of parental involvement to urban elementary school student academic achievement. *Urban Education*, 40, 237–269.
- Jiang, Z., Newman, A., Le, H., Presbitero, A., & Zheng, C. (2018). Career exploration: A review and future research agenda. *Journal of Vocational Behavior*, 110, 338–356.
- Kettererson, T. U., & Blustein, D. L. (1997). Attachment relationships and the career exploration process. *Career Development Quarterly*, 46, 167–178. <https://doi.org/10.1002/j.2161-0045.1997.tb01003.x>.
- Kracke, B. (1997). Parental behaviors and adolescents' career exploration. *The Career Development Quarterly*, 45(4), 341–350.
- Kracke, B. (2002). The role of personality, parents and peers in adolescents career exploration. *Journal of Adolescence*, 25, 19–30.
- Kracke, B., & Schmitt-Rodermund, E. (2001). Adolescents' career exploration in the context of educational and occupational transitions. *Navigating through adolescence: European perspectives* (pp. 141–165).
- Larose, S., Duchesne, S., Boivin, M., Vitaro, F., & Tremblay, R. E. (2015). College completion: A longitudinal examination of the role of developmental and specific college experiences. *International Journal of School and Educational Psychology*, 3, 143–156.
- Lazarides, R., Rohowski, S., Ohlemann, S., & Ittel, A. (2016). The role of classroom characteristics for students' motivation and career exploration. *Educational*

- Psychology*, 36(5), 992–1008.
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior*, 45, 79–122.
- Lent, R. W., Brown, S. D., & Hackett, G. (2000). Contextual supports and barriers to career choice: A social cognitive analysis. *Journal of Counseling Psychology*, 47, 36–49.
- Li, Y., Guan, Y., Wang, F., Zhou, X., Guo, K., Jiang, P., & Fang, Z. (2015). Big-five personality and BIS/BAS traits as predictors of career exploration: The mediation role of career adaptability. *Journal of Vocational Behavior*, 89, 39–45.
- Litalien, D., & Guay, F. (2010). Validation d'un modèle motivationnel des aspirations professionnelles. *Revue Canadienne de l'Éducation*, 33, 732–760.
- Liu, J., & McMahon, M. (2017). Child career development in family contexts. In M. Watson, & M. McMahon (Eds.). *Career exploration and development in childhood: Perspectives from theory, research and practice* (pp. 101–113). London, UK: Routledge.
- Luzzo, D. A. (1995). Gender differences in college students' career maturity and perceived barriers in career development. *Journal of Counseling & Development*, 73(3), 319–322.
- Mageau, G. A., Ranger, F., Joussemet, M., Koestner, R., Moreau, E., & Forest, J. (2015). Validation of the perceived parental autonomy support scale (P-PASS). *Canadian Journal of Behavioural Science*, 47, 251–262.
- Moreau, E., & Mageau, G. A. (2013). Conséquences et corrélats associés au soutien de l'autonomie dans divers domaines de vie. *Psychologie Française*, 58(3), 195–227.
- Morin, A. J., Maiano, C., Nagengast, B., Marsh, H. W., Morizot, J., & Janosz, M. (2011). General growth mixture analysis of adolescents' developmental trajectories of anxiety: The impact of untested invariance assumptions on substantive interpretations. *Structural Equation Modeling: A Multidisciplinary Journal*, 18(4), 613–648.
- Morin, A. J., Meyer, J. P., Creusier, J., & Biétry, F. (2016). Multiple-group analysis of similarity in latent profile solutions. *Organizational Research Methods*, 19(2), 231–254.
- Morizot, J. (2003). *Le développement de la personnalité de l'homme de l'adolescence au milieu de la vie: approches centrées sur les variables et sur les personnes*. Doctoral thesis. Retrieved at University of Montreal <https://papyrus.bib.umontreal.ca/xmlui/bitstream/handle/1866/6725/these.pdf>.
- Muthén, L. K., & Muthén, B. O. (2009). *Mplus User's Guide*. CA: Muthén & Muthén.
- Nagin, D. (2005). *Group-based modeling of development*. Cambridge, MA: Harvard University Press.
- Negru-Subtirica, O., Pop, E. I., & Crocetti, E. (2015). Developmental trajectories and reciprocal associations between career adaptability and vocational identity: A three-wave longitudinal study with adolescents. *Journal of Vocational Behavior*, 88, 131–142.
- 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.
- Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling*, 14(4), 535–569.
- Oliveira, I. M., Porfeli, E. J., & Taveira, M. C. (2017). Children's career exploration and development: Research overview and agenda. In M. Watson, & M. McMahon (Eds.). *Career exploration and development in childhood: Perspectives from theory, research and practice* (pp. 73–86). London, UK: Routledge.
- Patton, W., Bartrum, D. A., & Creed, P. A. (2004). Gender differences for optimism, self-esteem, expectations and goals in predicting career planning and exploration in adolescents. *International Journal for Educational and Vocational Guidance*, 4(2), 193–209.
- Patton, W. A., & McMahon, M. L. (2014). *Career development and systems theory: Connecting theory and practice* (3rd ed.). Rotterdam, The Netherlands: Sense Publishers.
- Pomerantz, E. M., Moorman, E. A., & Litwack, S. D. (2007). The how, whom, and why of parents' involvement in children's academic lives: More is not always better. *Review of Educational Research*, 77(3), 373–410.
- Pop, E. I., Negru-Subtirica, O., Crocetti, E., Opre, A., & Meeus, W. (2016). On the interplay between academic achievement and educational identity: A longitudinal study. *Journal of Adolescence*, 47, 135–144.
- Porfeli, E. J., Lee, B., & Vondracek, F. W. (2013). Identity development and careers in adolescents and emerging adults: Content, process, and structure. In W. B. Walsh, M. L. Savickas, & P. J. Hartung (Eds.). *Handbook of vocational psychology: Theory, research, and practice* (pp. 133–153). New York, NY: Routledge/Taylor & Francis.
- Porfeli, E. J., & Skorikov, V. B. (2010). Specific and diverse career exploration during late adolescence. *Journal of Career Assessment*, 18(1), 46–58.
- Ratelle, C. F., & Duchesne, S. (2017). The role of parents in supporting adaptation in school: A motivational perspective. In H. W. Marsh, R. G. Craven, D. M. McInerney, & F. Guay (Vol. Eds.), *Advances in self research: Vol. 6*. Charlotte, NC: Information Age.
- Ratelle, C. F., Duchesne, S., & Guay, F. (2017). Predicting students' adjustment from multiple perspectives on parental behaviors. *Journal of Adolescence*, 54, 60–72.
- Ratelle, C. F., Duchesne, S., Guay, F., & Boisclair Châteauevert, G. (2018). Comparing the contribution of overall structure and its specific dimensions for competence-related outcomes: A bifactor model. *Contemporary Educational Psychology*, 54, 89–98.
- Reed, M. B., Bruch, M. A., & Haase, R. F. (2004). Five-factor model of personality and career exploration. *Journal of Career Assessment*, 12(3), 223–238.
- Robitschek, C., & Cook, S. W. (1999). The influence of personal growth initiative and coping styles on career exploration and vocational identity. *Journal of Vocational Behavior*, 54(1), 27–141.
- Rogers, M. E., Creed, P. A., & Glendon, A. I. (2008). The role of personality in adolescent career planning and exploration: A social cognitive perspective. *Journal of Vocational Behavior*, 73(1), 132–142.
- Rumberger, R. W. (1983). Dropping out of high school: The influence of race, sex, and family background. *American Educational Research Journal*, 20(2), 199–220.
- Russell, L. H., Gould, K. L., & Fergus, T. A. (2017). Self-construal and gender interact to cause social evaluative concerns. *Personality and Individual Differences*, 109, 51–55.
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York, NY: Guilford.
- Schaefer, E. S. (1965). Children's reports of parental behavior: An inventory. *Child Development*, 413–424.
- Schmitt-Rodermund, E., & Vondracek, F. W. (1999). Breadth of interests, exploration, and identity development in adolescence. *Journal of Vocational Behavior*, 55(3), 298–317.
- Schulenberg, J. E., Vondracek, F. W., & Crouter, A. C. (1984). The influence of the family on vocational development. *Journal of Marriage and the Family*, 129–143.
- Singh, K., Bickley, P. G., Trivette, P., Keith, T. Z., Keith, P. B., & Anderson, E. (1995). The effects of four components of parental involvement on eighth-grade student achievement: Structural analysis of NELS-88 data. *School Psychology Review*, 24(2), 299–317.
- Skinner, E., Johnson, S., & Snyder, T. (2005). Six dimensions of parenting: A motivational model. *Parenting: Science and Practice*, 5, 175–235.
- Soenens, B., & Vansteenkiste, M. (2005). Antecedents and outcomes of self-determination in 3 life domains: The role of parents' and teachers' autonomy support. *Journal of Youth and Adolescence*, 34(6), 589–604.
- Soenens, B., Vansteenkiste, M., Lens, W., Luyckx, K., Goossens, L., Beyers, W., & Ryan, R. M. (2007). Conceptualizing parental autonomy support: Adolescent perceptions of promotion of independence versus promotion of volitional functioning. *Developmental Psychology*, 43, 633–646.
- Soresi, S., Nota, L., Ferrari, L., & Ginevra, M. C. (2014). Parental influences on youth's career construction. *Handbook of career development* (pp. 149–172). New York, NY: Springer.
- Statistics Canada (2013). Median total income, by family type, by province and territory. <http://www40.statcan.gc.ca/101/cst01/famil108a-eng.htm>.
- Statistics Canada (2015). Tendances liées au choix de carrière des jeunes Canadiens et les études postsecondaires qui lui sont associées. Retrieved at [www.statcan.gc.ca/pub/81-599-x/81-599-x2015010-fra.htm/](http://www.statcan.gc.ca/pub/81-599-x/81-599-x2015010-fra.htm/).
- Steinberg, L., & Silk, J. S. (2002). Parenting adolescents. In M. H. Bornstein (Ed.). *Handbook of parenting: Children and parenting* (pp. 103–133). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- Stumpf, S. A., & Colarelli, M. (1980). Career exploration: Development of dimensions and some preliminary findings. *Psychological Reports*, 47(3), 979–988.
- Stumpf, S. A., Colarelli, S. M., & Hartman, K. (1983). Development of the career exploration survey (CES). *Journal of Vocational Behavior*, 22(2), 191–226.
- Super, D. E. (1953). A theory of vocational development. *American Psychologist*, 8(5), 185.
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6<sup>th</sup> ed.). Boston, MA: Pearson Education.
- Terenzini, P. T., Springer, L., Yaeger, P. M., Pascarella, E. T., & Nora, A. (1996). First generation college students: Characteristics, experiences, and cognitive development. *Research in Higher Education*, 37(1), 1–22.

- Tucker, C. J., Barber, B. L., & Eccles, J. S. (2001). Advice about life plans from mothers, fathers, and siblings in always-married and divorced families during late adolescence. *Journal of Youth and Adolescence*, 30, 729–747.
- Vallerand, R. J. (1989). Vers une méthodologie de validation trans-culturelle de questionnaires psychologiques: Implications pour la recherche en langue française. *Canadian Psychology*, 30, 662–680.
- Vignoli, E., Croity-Belz, S., Chapeland, V., de Fillipis, A., & Garcia, M. (2005). Career exploration in adolescents: The role of anxiety, attachment, and parenting style. *Journal of Vocational Behavior*, 67, 153–168.
- Vitaro, F., Brendgen, M., Larose, S., & Tremblay, R. E. (2005). Kindergarten disruptive behaviors, protective factors, and educational achievement by early adulthood. *Journal of Educational Psychology*, 97(4), 617.
- Vondracek, F. W. (1990). A developmental-contextual approach to career development research. *Methodological approaches to the study of career* (pp. 37–56). .
- Vondracek, F. W. (2001). The developmental perspective in vocational psychology. *Journal of Vocational Behavior*, 59, 252–261.
- Wilson, P. M., & Wilson, J. R. (1992). Environmental influences on adolescent educational aspirations: A logistic transform model. *Youth & Society*, 24(1), 52–70.
- Wright, S. L., & Perrone, K. M. (2008). The impact of attachment on career-related variables: A review of the literature and proposed theoretical framework to guide future research. *Journal of Career Development*, 35, 87–106.
- Wu, C., & Chao, R. K. (2011). Intergenerational cultural dissonance in parent–adolescent relationships among Chinese and European Americans. *Developmental Psychology*, 47, 493–508.
- Young, R. A. (1983). Career development of adolescents: An ecological perspective. *Journal of Youth and Adolescence*, 12(5), 401–417.
- Young, R. A., Marshall, S. K., Domene, J. E., Arato-Bollivar, J., Hayoun, R., Marshall, E. C., et al. (2006). Relationships, communication, and career in the parent-adolescent projects of families with and without challenges. *Journal of Vocational Behavior*, 68, 1–23.
- Young, R. A., Valach, L., Ball, J., Paseluklio, M. A., Wong, Y. S., DeVries, R. J., et al. (2001). Career development in adolescence as a family project. *Journal of Counseling Psychology*, 48, 190–202.