Social exchange styles:
An evolutionary model of individual differences in exchange relationships

Michelle J. Leybman
Department of Psychology
McGill University, Montreal, QC, Canada
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ABSTRACT

Evolutionary psychology is a theoretical perspective that is increasingly supported by empirical studies, but its potential to be applied to personality psychology remains largely unfulfilled (Buss, 1999). The current dissertation sought to bring the perspective of evolutionary psychology to bear on personality psychology. Zuroff and colleagues (2010) proposed that an evolutionary theory of personality could seek to identify individual differences in the core social domains that are postulated by evolutionary psychologists. Following this line of thinking, the Social Exchange Styles Questionnaire (SESQ) was developed to assess individual differences within the reciprocity domain (Leybman et al., 2011a).

For this dissertation, the social exchange style model was further developed and explored. Article 1 presented an expanded social exchange style model, along with the revised Social Exchange Styles Questionnaire (SESQ-II), which assesses individual differences in ways that people approach and maintain exchange relationships in terms of five dimensions: Tracking, Fairness, Individualism, Benefit-Seeking, and Overinvestment. The SESQ-II showed good internal consistency, retest reliability, and construct validity. Regarding construct validity, multiple regressions demonstrated that none of the social exchange style dimensions was redundant with the Personal Norms of Reciprocity Scale (Perugini et al., 2003), another measure of individual differences related to social exchange, nor with dimensions of adult attachment styles. Additionally, multiple regressions demonstrated that the social exchange style dimensions had
predictable relationships with the five-factor traits, and with variables related to perceptions of oneself and others. Article 1 also addressed the relationship between social exchange style dimensions and perceived and received social support in a second study that used a daily diary method. Multilevel modeling showed that Tracking and Overinvestment each negatively predicted perceived support, while Fairness positively predicted perceived support. Additionally, Individualism negatively predicted received support. Social exchange style dimensions predicted social support over and above the five-factor traits.

Article 2 sought to extend the social exchange style model and did this by focusing on a single social exchange dimension: Tracking. The developmental antecedents and affective consequences of Tracking were explored. Biological market theory (Noë & Hammerstein, 1994; 1995) was used to identify potential developmental antecedents to Tracking. Multiple regression analyses showed that Tracking was predicted by recalled experiences of having less access to resources than one’s peers, having low control over resources, and parental overprotectiveness. Tracking was also predicted by an interaction of low parental warmth and being spoiled. To test the affective consequences of Tracking, we examined the relationship between people’s Tracking levels and their emotional reactions to received social support. Using the same sample that was used in the second study of Article 1, multilevel analyses showed that people who were high in Tracking experienced more Joviality on days when they experienced particularly high levels of received support, and that they experienced high Hostility on days when they experienced less received support than usual. Similar
results were not obtained with Serenity, Fear, or Guilt as the dependent variables, demonstrating the specificity of the effects to Joviality and Hostility.

The results of these studies are discussed in terms of theoretical contributions that stem from integrating evolutionary psychology with personality psychology. Additionally, avenues for future research to elaborate both the content and process components of our model of social exchange styles are identified. Finally, practical applications of social exchange styles are discussed with a focus on implications for conceptualization and treatment of disorders within clinical psychology.
RÉSUMÉ

La psychologie évolutionniste est une perspective théorique de plus en plus consolidée par des études empiriques, mais son application potentielle à la psychologie de la personnalité demeure inassouvie (Buss, 1999). La présente thèse se veut une conciliation de la psychologie évolutionniste et la psychologie de la personnalité. Zuroff et ses collègues (2010) suggèrent qu’une théorie évolutionnaire de la personnalité pourrait permettre l’identification de différences individuelles existant dans les domaines sociaux fondamentaux postulé par la psychologie évolutionniste. Conséquemment, le questionnaire des styles d’échanges sociaux (Social Exchange Styles Questionnaire- SESQ) fut développé dans le but d’évaluer les différences individuels dans le domaine de la réciprocité (Leybman et al., 2011a).

Dans cette thèse, le modèle de style d’échange social fut développé et exploré en plus de détails. L’article 1 a présenté un modèle plus détaillé des styles d’échanges sociaux, ainsi que la version révisée du questionnaire des styles d’échanges sociaux (SESQ-II), lequel évalue les différences individuels dans la façon dont les gens approchent et maintiennent des relations d’échange selon 5 dimensions : Poursuite, Justice, Individualisme, Recherche de Bénéfices et Surinvestissement. Le SESQ-II a démontré une bonne cohérence interne, fidélité de re-test et validité du construit. Des régressions multiples confirment qu’aucune des dimensions de style d’échange sociale n’étaient redondantes avec l’échelle de réciprocité de normes personnelles (Personal Norms of Reciprocity Scale) (Perugini et al., 2003), une autre mesure de différences individuels liée à
l'échange sociale, ni avec les dimensions de styles d'attaches adultes. De plus, des régressions multiples démontrent que les dimensions de styles d'échange social avaient de relations prévisibles avec les cinq facteurs de trait (five-factor traits), et avec des variables liées aux perceptions de soi et d’autrui. L’Article 1 adresse aussi le lien entre les dimensions de styles d’échange sociale et le support sociale reçu et perçue lors d’une seconde étude qui a utilisé une technique de journal quotidien. Du modelage à multiple niveaux a montré que la Poursuite et le Surinvestissement prédissent individuellement de façon négative la perception de support, tandis que la Justice prédit positivement la perception de support. De plus, l’Individualisme prédit négativement la réception de support. Les dimensions de style d’échange social prédissent le support social au-delà des cinq facteurs de trait (five-factor traits).

L’article 2 tentait d’enrichir le model d’échange social en en étudiant une seule dimension d’échange sociale : la Poursuite. Les antécédents développementaux et conséquences affectives de la Poursuites ont été explorés. La théorie du Marcher Biologique (Biological market – Noe & Hammerstein, 1994; 1995) a été utilisé pour identifier de potentiels antécédents développementaux de la Poursuite. Une régression multiple indique que la Poursuite pouvans être prédite par les mémoires d’instances d’avoir eu moins de ressources que ses pairs, d’avoir eu peu de control de ressources, ainsi que de surprotection parentale. La poursuite a aussi été prédite par une interaction entre peu de chaleur parentale et être gâté. Afin de tester les conséquences affectives de la Poursuite, nous avons examiné la relation entre le niveau de Poursuite des
gens et leurs réactions émotionnelles face au support sociale reçu. En utilisant la même sous-population qui a été utilisé ultérieurement durant la deuxième étude de l’Article 1, des analyses a multiniveaux ont démontré que les gens qui avaient de haut niveaux de Poursuite ressenti plus de Jovialité durant les jours durant lesquels ils ont reçu des niveaux de support particulièrement élevés. Ils ont aussi ressenti de hauts niveaux d’Hostilité durant les jours ou ils rapportent d’avoir reçu de plus bas niveaux de support qu’à l’habitude. De résultats similaires n’ont pas été obtenus avec les mesures de Sérénité, de Peur, ou de Culpabilité en tant que variables dépendantes, démontrant ainsi la spécificité des effets à la Jovialité et l’Hostilité.

Les résultats de ces études sont adressés en termes de contributions théorique qui surviennent de l’intégration de la psychologie évolutionniste et la psychologie de la personnalité. De plus, nous avons identifiés des pistes de recherche pour le futur pour élaborer les composantes du contenu et du processus de notre model d’échange sociale. Finalement des applications pratiques de styles d’échange social sont discutées en mettant de l’emphase sur les implications pour la conceptualisation et le traitement de troubles mentaux dans le contexte de la psychologie clinique.
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CONTRIBUTION OF AUTHORS

In accordance with McGill University’s requirement, an explicit statement of the contribution of individuals who have co-authored the manuscripts that appear in this dissertation is provided. The present dissertation comprises two manuscripts, which present two studies each. The first article was published in *Personality and Individual Differences* and was co-authored by myself, David Zuroff, and Marc Fournier. The second article is currently under peer review and was co-authored by myself, David Zuroff, Marc Fournier, Daniel Kopala-Sibley, and Nora Hope.

I was involved in generating the research questions for each of the studies that are presented in the manuscripts. I was also involved in designing the study protocols, collecting the data, and analyzing and interpreting the data for each of the studies. Additionally, I reviewed the literature related to these studies and wrote the manuscripts that detailed the results.

David Zuroff contributed to generating ideas related to the overarching goals of this program of research, and he contributed to generating the specific research questions for each of the studies. He also provided feedback that contributed to designing each of the studies and provided input regarding data analyses and data interpretation. Finally, David Zuroff provided comments related to writing both manuscripts.

Marc Fournier contributed to generating ideas related to the overarching goals of this program of research. Additionally, he provided input for the conceptualization of the variables and measures that were used in the first study.
of Article 1, and for the first study of Article 2. Marc Fournier also provided comments regarding writing both manuscripts, and aided in addressing the revisions for Article 1 prior to its publication.

Daniel Kopala-Sibley and Nora Hope were both involved in designing the study protocol and in collecting the data for the first study in Article 2. They also both provided comments regarding writing the second article presented in this dissertation.
STATEMENT OF ORIGINAL CONTRIBUTION

The present thesis makes several original contributions to personality and social psychology literature. Overall, it contributes to the literature that seeks to integrate evolutionary psychology with personality psychology, which has been identified as an understudied area by many researchers (e.g., Buss, 2009; Figueredo, Sefcek, Vásquez, Brumbach, King, & Jacobs, W.J). This dissertation presents a novel way to pursue this integration, in which individual differences in evolutionarily relevant domains are identified and assessed. No other program of research to date has used this strategy. Additionally, this dissertation presents a new questionnaire that uses this approach to assess individual differences in the social-exchange domain. Personality differences in the domain of social exchange have rarely been conceptualized or assessed, and no questionnaire prior to the one presented here has been developed to assess them from an evolutionary psychology perspective.

This thesis makes a further contribution to the literature that integrates evolutionary psychology and personality psychology by examining adaptive individual differences in social exchange styles. In general, although there is significant apparent variation in people’s personalities, evolutionary psychology has tended to treat these differences as random noise (e.g., Tooby & Cosmides, 1990). Recently, evolutionary psychologists have proposed theories suggesting that this variation could in fact be the result of adaptations (e.g., Buss, 2009; Penke, Denissen, & Miller, 2007). The present thesis adopts this perspective by considering childhood environments that might influence the development of
differences in social exchange styles. The data are interpreted through the lens of adaptive individual differences. This study was the first to consider the process by which social exchange styles mature and develop over the lifespan.

Finally, this dissertation makes a specific contribution to the social support literature. Much of the research about social support comes from a social psychological perspective. Some research has identified that there are different types of support that can be interpreted differently (e.g., Gleason, Iida, Shrout, & Bolger, 2008), but only a few studies (e.g., Swickert, Rosentreter, Hittner, & Mushrush, 2002) have explicitly examined individual differences that affect the way a person experiences and utilizes social support. This dissertation presents work that illustrates how people’s social exchange styles play a role in how they experience social support, which has not previously been tested.
GENERAL INTRODUCTION

Evolutionary psychology has emerged in recent years as a theoretical perspective that is increasingly supported by empirical studies (Confer et al., 2010). However, its potential to be applied to personality psychology remains largely unfulfilled (Buss, 1999; Buss, 2009; Figueredo, Gladden, Vásquez, Wolf, & Jones, 2009). In the current dissertation, I work towards merging these two areas. Zuroff, Fournier, Patall, and Leybman (2010) proposed that an evolutionary theory of personality would seek to identify individual differences in the core domains of social living that are postulated by evolutionary psychologists. Following from this line of thinking, I created a measure of individual differences within the domain of reciprocity, or social exchange, and focused on validating this instrument. I then focused my attention on deepening understanding of one dimension on which people exhibit individual differences in approaching social exchange: Tracking. To understand why people exhibit such variability in their propensity to track, I explored the childhood environment associated with developing high levels of Tracking in adulthood. Additionally, to better understand how Tracking levels affect people in their current environments, I tested how Tracking affects current social support dynamics. Before presenting my results, I will review the theoretical and empirical literatures that inspired my studies. One manuscript will then present findings related to developing and validating a new social exchange styles scale, and will present a five-factor model of social exchange styles. Next, a second manuscript will present findings related to the developmental antecedents and affective consequences of Tracking. I will...
conclude by discussing the empirical and theoretical contributions of my research and will propose various practical applications and avenues for future research.

Introduction to Evolutionary Psychology

Evolutionary theory is a unified way of understanding the biology of all living organisms. The fundamental elements of this theory were outlined by Darwin (1859), who proposed that anatomical traits are the result of natural selection (suggesting that variants that help an organism to survive or reproduce are transmitted to future generations), and sexual selection (suggesting that variants that help an organism compete with others of the same sex, or to attract members of the opposite sex are transmitted to future generations). Each organism is made up of adaptations, which are inherited traits that reliably solved problems related to survival and reproduction more effectively than competing alternatives.

Evolutionary psychology is a paradigm that applies the fundamental principles of evolutionary biology to the study of human behaviour (Tooby & Cosmides, 1992). According to this theory, our present behavioural tendencies developed through natural and sexual selection in response to the problems that most persistently challenged our hunter-gatherer ancestors (Barkow, Cosmides, & Tooby, 1992; Barrett, Dunbar, & Lycett, 2002; Buss, 2005). In the same way that physiological traits are adapted to solve specific problems associated with survival and reproduction, we have developed evolved psychological mechanisms (EPMs), based on the same forces that drive the selection of anatomical traits (Barkow et al., 1992). These EPMs are adaptations that guide our thinking and the expression of our behaviour. They are adapted to solve the basic problems that
were characteristic of living during hunter-gatherer times such as finding food, selecting a mate, and protection from predators (Tooby & Cosmides, 2005).

EPMs can be thought of as information-processing circuits. They are postulated to take in information from the environment and to use various decision rules to generate output that solves particular adaptive problems (Larsen & Buss, 2010). This output can take the form of behaviours, cognitions, physiological reactions, or emotions, which in turn motivate behaviour (Buss, 2008; Cosmides & Tooby, 1987).

EPMs did not evolve in responses to problems in modern living, but instead are responses to problems faced by our ancestors beginning in the Pleistocene era, or the environment of evolutionary adaptiveness (EEA) (Tooby & Cosmides, 1992). Consequently, it might sometimes appear that our behaviour is not adaptive, in that it is unclear how it results in current benefits related to survival or reproduction. When thinking about adaptiveness in an evolutionary sense, it is essential to remember this point and thus not to ask oneself whether EPMs result in people feeling happy or content in the current environment or even whether behaviours are functional in the current environment, but rather we must think about how EPMs would have promoted survival in the EEA.

One clear example of EPMs that has been well supported empirically relates to EPMs associated with fear responses (Mineka & Öhman, 2002; Öhman & Mineka, 2003). Various studies have demonstrated that humans and other primates pay far more attention to stimuli that resemble threats that would have been present in the EEA, such as snakes or spiders (Mineka & Öhman, 2002).
These threat-related stimuli jump out as particularly important information, and tend to invoke physiological responses that motivate behaviours related to fear, such as fleeing a situation. Expanding on this, Confer and colleagues (2010) point out that evolutionarily relevant threats such as snakes are consistently more feared than evolutionarily modern dangers such as cars and guns, even though the latter are more dangerous in the current environment. In addition to serving distinct adaptive problems, EPMs can interact with each other in order to produce optimally adaptive behaviour given an array of adaptive challenges. For example, when a person is faced with the problems of hunger and a dangerous predator simultaneously, fear of the predator will dull hunger until the imminent threat has subsided (Buss, 2008).

**Benefits of Merging Personality Theory with Evolutionary Psychology**

Personality psychology is the study of how people are unique, or differ from one another. Larsen and Buss (2010) have defined personality as: “the set of psychological traits and mechanisms within the individual that are organized and relatively enduring and that influence his or her interactions with, and adaptations to, the intrapsychic, physical, and social environments” (pp. 4). This definition encompasses the view that personality is relatively stable, but also interacts with the environment, and thus can manifest differently depending on context. This understanding is distinct from others in that it integrates two opposing views of personality; one view that posits that much of personality is very stable even across decades and that understanding a person relates to understanding what is innate to them (e.g., Costa, McCrae, & Arenberg, 1980), and another which
suggests that a person’s personality is made up of responses to variations in his or her environment (e.g., Mischel & Shoda, 1995). Nettle and Penke (2010) have also described personality in this way, seeing is an interaction of a person and a situation. The thinking about personality presented in this dissertation is largely in line with the interactionist view that takes both perspectives into account. Evolutionary psychology provides a framework within which to understand personality working in this way by understanding how innate EPMs interact with and respond to a person’s environment to make up his or her personality.

Using evolutionary psychology framework can contribute to developing a unifying theory of personality. Several researchers have sought to propose a unifying theory of personality, but each of these theories to date is missing some important elements. Classic theories such as those of Freud and Jung are persuasive and appeal to those who seek to understand people holistically. These psychoanalytic theories allow us to understand individuals comprehensively and provide explanations of the mechanisms by which each person developed his or her own unique personality. However, these theories have been criticized for being made up of variables that are difficult to measure and operationalize. Additionally, it is difficult to test these theories.

Other personality psychologists have pushed the pendulum in the opposite direction, putting forth theories that focus somewhat less on process, but that are more readily measurable and testable. The five-factor model of personality is an example of this type of theory in that each of the five factors is derived empirically, has been successfully operationalized, and measures related to the
five factor traits have been very well-validated. However, the five-factor model focuses less on a description of why people are the way they are, outside of providing strong evidence that the five-factor traits are highly heritable (Loehlin, McCrae, Costa, & John, 1998). Additionally, some have argued that the five-factor model misses some content of personality differences, for example not accounting for traits such as self-esteem and faithfulness (Larsen & Buss, 2010).

Rotter and Hochreich (1975) proposed that any unifying theory of personality would need to include a content component and a process component. The content component refers to a description of individual differences, whereas the process component refers to explanations of how personality is acquired and changed. Although most theories do address both components, the weakness of classic psychoanalytic theories is their relatively low focus on content compared to process, and the weakness of trait-focused theories is their relative dearth of focus on process as compared to content. We propose that by integrating evolutionary psychology with personality psychology, we can take a step towards eventually having a unified theory of personality that is strong in terms of both content and process. We anticipate that this theory would both describe the major dimensions of individual differences, and provide a model for how those differences arise.

Recently, some researchers have made significant strides in applying evolutionary psychology to personality psychology (e.g., Figueredo et al., 2009; Denissen & Penke, 2008; Penke, 2010), but their strategies for approaching this integration have differed from ours. In general, previous attempts to achieve this
integration have used a top-down method in which researchers have sought to provide evolutionary rationales for personality variables that are already well established. As one illustration of this strategy, Nettle (2006) has done impressive work outlining a theory of how the five-factor traits would have evolved, for example linking Extraversion to number of sexual partners, which would in turn increase fitness. Denissen and Penke (2008) use a similar overall approach by providing a sophisticated proposal of candidate psychological mechanisms that underlie variation in each of the five-factor traits.

In contrast with this general style of merging evolutionary psychology with personality psychology, in this dissertation I use a bottom-up method. Instead of starting with traits that have already been postulated and explaining why they make evolutionary sense, we have proposed developing a set of traits that stem from evolutionary theory and developing measures of those traits (Zuroff et al., 2010). In deciding which traits to define and assess, we looked to one of the core concepts of evolutionary psychology: domain specificity. As explained by Zuroff et al. (2010), our overall strategy to begin working towards a unified theory of personality was to work from an evolutionary psychology framework to select the core domains of social behaviour and to then identify individual differences in the behaviours that would relate to those core domains.

Domains Influencing the Development of EPMs

Barkow, Cosmides and Tooby (1992) proposed that the problems that were faced by our ancestors in the EEA were densely clustered in specific, recurrent families, such as predator avoidance, mating, and eating. Expanding on
this idea, theorists across a variety of perspectives have classified the challenges of social living into distinct domains. These theorists typically point to a finite set of adaptive problems that were faced in the EEA. For example, Kenrick and Trost (1997) conceptualize domain specificity as a variety of sets of mechanisms that regulate decisions related to sexual relationships, kin relationships, friendships, and hierarchies. These domains essentially constitute bodies of knowledge that act as guides for interacting with the environment and helped us to solve recurring problems in the EEA (Hirschfeld & Gelman, 1994). Our EPMs are adaptations that are meant to solve the central evolutionary problems within each of these domains (Tooby & Cosmides, 2005).

Bugental’s (2000) conceptualization of domain specificity is particularly compelling and parsimonious. She proposes that there are some areas that are consistently present across theoretical suggestions for evolutionarily-based core domains, specifically attachment, social rank, coalition groups, mating, and reciprocity. For her, the attachment domain allows for proximity-maintenance, care-eliciting, and care-giving, all in the service of safety. The social rank domain allows for pursuit, recognition, maintenance, and use of hierarchical patterns. The coalition domain allows for recognition and defense of lines between in-groups and out-groups. The mating domain allows for selection of and access to sexual partners. Finally, the reciprocity domain allows for the management of costs and benefits, and of reciprocal obligations that are involved in communal life. This dissertation focuses on individual differences within the reciprocity domain, which we also refer to as the domain of social exchange.
The Reciprocity Domain

Reciprocity, social exchange, and cooperation represent a fundamental aspect of group living. In ancestral societies, social exchange took the form of activities such as food sharing and negotiating the division of tasks related to predation defence or hunting. Today the changing environment means that perhaps negotiating with a friend about who will go hunting is rare, but exchange dynamics are still prevalent. Any time one friend asks another for a favour, or when someone pays a dinner bill insisting that their dining companion will “get them next time,” exchange dynamics are at play. However, considering the evolution of behaviour in exchange relationships presents an interesting dilemma because exchange relationships can involve sharing one’s resources with someone else, which can be costly for one individual in the relationship, while beneficial for the other. This presents a tension within evolutionary theory because it is inconsistent with how many people understand Darwinian competition. Because of this tension, one might expect that helping would have been selected out of our behavioural repertoire (Hamilton, 1964), but observation suggests this is not the case. Exchanges often occur in which one’s resources are invested without the guarantee of a net gain. There are a multitude of examples in which people appear to act irrationally from an economic perspective. Thus, theories are necessary to account for the cooperative and seemingly altruistic behaviour that we see around us.

One theory to account for altruistic behaviour is kin altruism, which suggests that organisms will share resources with others who are genetically close
to them, thus indirectly passing on their own genes (Hamilton, 1964; Trivers, 1971). This promotes what evolutionary theorists refer to as *indirect fitness*, whereby a gene that might prompt a particular behaviour that would enhance the fitness of relatives, but decrease that of the individual engaging in the behavior, may still be selected for because relatives often share genes. However, people do not restrict their generosity or helping behaviours to members of their families (Hamilton, 1964). Time and again, researchers find that humans (e.g., de Waal, 1996), non-human primates (e.g., Silk, 1992) and non-primates (e.g., Wilkinson, 1990) engage in costly behaviours that are beneficial to non-kin others.

As a result of the evident ubiquity of sharing and cooperation among non-relatives in human societies, the idea of reciprocal altruism was developed (Trivers, 1971). This notion proposes that it is beneficial to help those who will eventually provide help in return. If a person is assured that their efforts will be reciprocated at some point in the future then, despite the immediate cost, there can be a longer-term net gain (Buss, 1999). As an example from the EEA, if a hunter were to catch a rabbit, would he be better off to eat it all himself and be full, or to share it among his social group so that no one was completely full nor would anyone starve? In terms of reciprocal altruism, the hunter is best served by sharing the rabbit. If he shares it, reciprocal altruism would suggest that the next time he is starving another hunter would be more likely to share their catch with him. Another classic example of reciprocal altruism comes from the animal behavior literature. Wilkinson (1990) discovered that vampire bats often regurgitate a portion of blood they have just eaten and feed it to others in the bat colony. As
opposed to randomly feeding all bats that appeared hungry, Wilkinson (1990) demonstrated that bats were significantly more likely to give blood to others from whom they have received blood in the past. In sum, Wilkinson (1990) suggested that individuals invest in relationships that provide cues to the possibility of potential benefits at some later time.

Although reciprocal altruism was an important development in theorizing about the evolution of exchange behaviour, critics pointed out several issues with the data that fueled further theorizing about the adaptive benefits of cooperation. For example, non-helping behaviour among Wilkinson’s bats was not punished in the short- or long-term, which is inconsistent with the proposal that individuals help others who will provide them with help in return. Additionally, the bats that were examined were, on average, cousins, so that helping behaviour could be accounted for by kin altruism. Finally, reciprocal altruism is limited in that it focuses on direct tit-for-tat interactions rather than focusing on long-term exchange relationships in which reciprocity does not always occur right away, does not account for the exchange of resources differing in value, and does not factor in the ability of individuals to select from a wide range of potential exchange partners (Barrett & Henzi, 2006).

One theory that has been developed to address the limits of reciprocal altruism is called mutualism (Clutton-Brock, 2009). This theory suggests that cooperation can result in immediate shared benefits that exceed the cost of helping. For example, cooperation among hunting partners can increase total success in both acquiring and defending food (Creel & Creel, 2001). Similarly,
working together can increase success in territorial defense (Clutton-Brock, 2002). In this theory, helping is distinct from reciprocity because costs are not necessarily involved, even if they appear to be on the surface, and because there is less opportunity for cheating (Brown & Vincent, 2008). Although all partners must acquire some benefits from these relationships, they can be best understood as examples of mutually beneficial alliances, rather than examples of reciprocal altruism (Clutton-Brock, 2009).

To address other limitations of reciprocal altruism, a relatively recent theory has emerged in the field of evolutionary psychology, termed *Biological market theory* (Noë & Hammerstein, 1994; 1995). This theory proposes that social exchange networks share characteristics with economic markets, in that exchange relationships center around trading goods and services, which fluctuate in value based on supply and demand (Noë and Hammerstein, 1994). The value of having good English speaking skills around the world provides a useful illustration for how supply and demand plays a role in social exchange. In London, speaking English well is the norm, and so English skills are worth little in terms of exchange (high supply, low demand). In Montreal, good English skills are moderately common and in moderate demand; thus, they can be exchanged for some resources, but one cannot typically make a living based on being an English speaker (moderate supply, moderate demand). In Beijing, speaking English is a rare and widely sought service, and thus can be exchanged for valuable resources (i.e., a high salary) (low supply, high demand). The value of resources depends on the extent to which they are available and sought after.
Biological market theory also stresses the importance of partner choice and partner value in social exchange (Noë & Hammerstein, 1995). Regarding partner value, this theory posits that exchange partners differ from one another based on characteristics such as propensity to cheat or free-ride, status, access to resources, and loyalty. Partners have differential values based on qualities like these.

Because having social exchange partners leads to increased access to resources in general, people are generally motivated to seek them. However, each of the theories described above contributes to our view that there is room for significant individual variation in the social exchange domain. For example, people might differ in terms of how long they are willing to wait for an exchange partner to reciprocate. Biological market theory suggests that some exchange partners with access to resources that are high in demand could be more likely to exploit their exchange partners, while others with fewer resources might be prone to tolerating exploitation. Related to this, Denissen and Penke (2008) found evidence for individual differences in people’s motivation to react cooperatively versus selfishly in resource conflicts. People can also differ in their value as a partner, or in their tendencies to display their own partner-value (Nesse, 2007).

Within the framework of biological market theory, there is also room for variation in terms of personal characteristics such as loyalty to allies who might be in phases where they cannot provide resources, though they may have been valuable exchange partners in the past. Other examples of potential individual differences in this area include favouring short- versus long-term reciprocity, and the tendency to track costs and benefits in the context of social exchange. In general,
these individual differences in the social exchange domain have never been measured or studied systematically.

**Adaptive Individual Differences**

The study of personality relates to how people differ from one another, whereas early statements of evolutionary psychology suggested that consistent selective pressures promote within-species homogeneity and the existence of universals (e.g., Tooby & Cosmides, 1990). For many years, evolutionary psychologists proposed that individual differences in personality were best viewed as “noise” and that they were irrelevant to actual functioning, similar to the irrelevance of the colour of a car to its ability to run (Tooby & Cosmides, 1990). At the same time, human variation is so prevalent and appears to contribute so much to functioning, that neglecting it seems to deny a significant factor that characterizes humanity. This tension has sparked interest in recent years, with more and more evolutionary psychologists addressing the evolution of adaptive individual differences (see Buss, 2009; Buss & Greiling, 1999; Nettle, 2006; and Penke, Denissen, & Miller, 2007 for reviews). These authors suggest that at least some of the variance we see in human behaviour is actually the result of selective pressures in the EEA, or that variance in behavioural expressions can result from universal EPMs responding differently to distinct environmental inputs (e.g., Buss, 2009; Penke, Denissen, & Miller, 2007). Of the theories that seek to explain the evolutionary significance of individual differences, life history theory and various forms of balancing selection theory have received the most attention.
Life history theory proposes that within-species differences can reflect the major tradeoffs in life with respect to capturing and spending energy (Wolf, van Doom, Leimar, & Weissing, 2007). This theory emphasizes that energy is finite. For example, energy spent on defense against predators leads to less energy that can be spent on finding and consuming food. Natural selection favours organisms who gain and allocate energy effectively within their environment (Kaplan & Gangestad, 2005). There is also evidence that those with a shorter life expectancy use more risky strategies than average and are more prone to immediate resource expenditure (Daly & Wilson, 2005). In a classic example, Wolf and colleagues (2007) explained stable individual differences in risk-taking and caution related behaviour as a function of trade-offs related to timing of reproduction. Life history theory suggests that individuals who expect to reproduce late in life would be relatively cautious, since they would need to survive in order to realize their reproductive potential. Conversely, individuals expecting to reproduce early in life would be more likely to take risks since they would have less to lose. These models offer explanations for why individual differences can be seen as adaptive and provide impetus for research to focus attention on behavioural variation and animal personalities.

Balancing selection is a more common explanation for the adaptiveness of within species variation (e.g., Bergmüller, 2010). On the whole, this theory suggests that varying traits can be favoured by varying environments (Maynard Smith, 1982; Penke et al., 2007); however there are various specific forms of balancing selection such as frequency-dependent selection (Dall, Houston,
McNamara, 2004), and spatio-temporal environmental heterogeneity (Roff, 1997). Frequency dependent selection refers to the selection of two or more strategies within a population that are maintained at a particular frequency relative to each other. The fitness of each strategy decreases as the frequency of the strategy increases. For example, if individuals can engage in strategies where they either hunt for food, or exploit other hunters, then hunters would be more successful in a group of exploiters, whereas exploiters would be more successful in a group of hunters (Giraldeau & Dubois, 2008).

Spatio-temporal environmental heterogeneity suggests that different strategies will be selected in different environments. In a sense, this theory suggests that individuals are equipped with an array of behaviours that they have the potential to employ, but that the ones that they exhibit will depend on their surroundings. For example, in the Trinidadian guppy, researchers have shown that boldness is related to whether an individual comes from a population that lives upstream of waterfalls where there are few predators, or downstream of waterfalls where there are many predators (O’Steen, Cullum, & Bennett, 2002). Buss and Greiling have also referred to this process as early experiential calibration, discussing it as a process by which alternative strategies that are all part of a species-typical menu become preferred based on a person’s early environment. Depending on the cost of behavioural flexibility, a particular strategy can become dominant, or individuals can enact a variety of strategies flexibly depending on their immediate environment (Bergmüller, 2010; Buss, 2009).
Based on the idea that individual differences can be consistent with an evolutionary view of personality, Zuroff and colleagues (2010) proposed that an evolutionary theory of personality could seek to assess individual differences in each of Bugental’s (2000) five core domains. As previously discussed, while most personality measures could be classified into one of Bugental’s (2000) five core domains, only a few were actually developed using an explicit framework of evolutionary psychology, such as the measures of sociosexuality (Simpson & Gangestad, 1991), attachment styles (Cassidy & Shaver, 1999) and tactics of hierarchy negotiation (Kyl-Heku & Buss, 1996). None of the measures that have used an evolutionary psychology framework have been focused on exchange related behaviour. This dissertation focuses on individual differences within Bugental’s reciprocity domain, which refers to potentially mutually beneficial exchange interactions that occur between functionally equal individuals (Bugental, 2000). Bugental suggests that the function of the reciprocity domain is, “the management of the reciprocal obligations and benefits that are involved in communal life” (Bugental, 2000: p. 187). Thus, species-typical EPMs should have evolved to respond to problems in managing costs and benefits in social exchange relationships. Given the ubiquity of individual differences in other domains of social behaviour (e.g., attachment, social rank and mating) it seemed highly probable to us that there would be significant individual differences in the operation of the species-typical mechanisms in the social exchange domain as well.
Pre-Dissertation Construct and Scale Development

In my review of the literature, the construct that seemed most similar to what we intended is personal norms of reciprocity (Perugini, Gallucci, Presaghi, & Ercolani, 2002). Perugini and colleagues (2002) assume that reciprocity is an internalized norm and postulate that there are individual differences in the extent to which people ascribe to this norm. The personal norms of reciprocity scale measures individual differences on three dimensions: positive reciprocity (the tendency to respond to positive interpersonal interactions and to reward positive events), negative reciprocity (the tendency to respond to negative interpersonal interactions and to punish negative events), and beliefs in reciprocity (belief in the efficacy and widespread use of reciprocal behaviour) (Perugini et al., 2002). This construct was not derived from an evolutionary basis and did not account for all of the individual differences related to social exchange that we hoped to capture, thus, we proceeded with scale development.

Prior to beginning the research presented in this dissertation, we developed an initial two-factor model of social exchange styles in order to understand individual differences in people’s approaches to exchange relationships based on Bugental’s conceptualization of the reciprocity domain (Leybman et al., 2011a). Because attachment is another one of the core domains of behaviour and has been so widely studied, we used Bartholomew and Horowitz’s (1991) model of attachment styles as a base for our initial social exchange styles model. Keeping the goal of a unified theory of personality in mind, we hoped that there would eventually be similarly constructed scales to
assess individual differences in each of the core domains of evolutionary psychology.

In the initial model, social exchange styles, like attachment styles, were conceptualized as being defined by two orthogonal dimensions (Leybman et al., 2011a). We hypothesized the dimensions of benefit-seeking and cost-vigilance to reflect Bugental’s (2000) conceptualization of the reciprocity domain as revolving around the management of costs and benefits in exchange relationships. These dimensions are consistent with literature that suggests that the two primary dimensions of self-regulation are the promotion of positive outcomes and the prevention of negative outcomes (Higgins, 1997). In our previous hypothesized model, we applied a promotion-prevention focus to the management of costs and benefits in exchange relationships.

In our initial conceptualization, benefit-seeking described a person’s focus on what they could gain from their social exchange relationships (promotion focus), while cost-vigilance referred to a person’s attunement to their investments in social exchange relationships (prevention focus). These dimensions were reflected in behaviours (e.g., frequency of investing effort), cognitions (e.g., thoughts related to short-term inequity) and motivations (e.g., investing in order to get a resource versus investing to maintain a long-term relationship). To elaborate, benefit-seeking could involve behaviour such as doing a favour for a friend, with the motivation of eliciting help from the same friend in the future. Cost-vigilance could involve behaviours such as mentally tracking how often a roommate does the dishes and terminating a relationship in which someone fails
to reciprocate. Figure 1.1 illustrates that by crossing these dimensions, four prototypic styles emerge: Exploiter, fair-trader, helper and individualist. These prototypes were not intended to represent discrete categories to which individuals could be assigned. Rather, as with the attachment model, these prototypes were exemplars that were meant to facilitate an understanding of the two continuously varying dimensions.

*Figure 1.1.* Social exchange style prototypes that emerge when two dimensions are crossed.

<table>
<thead>
<tr>
<th>High Benefit-Seeking</th>
<th>Low Benefit-Seeking</th>
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<td><strong>Fairtrader</strong></td>
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<td>Low Cost-Vigilance</td>
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<td></td>
<td><strong>Smart operator</strong></td>
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<td></td>
<td>High Cost-Vigilance</td>
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<tr>
<td></td>
<td><strong>Individualist</strong></td>
</tr>
<tr>
<td>Low Benefit-Seeking</td>
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Based on this model, the Social Exchange Styles Questionnaire (SESQ) was designed to examine individual differences in creating and maintaining social exchange relationships (Leybman, 2011a). Just as attachment theory was used as a model for the conceptualization of social exchange styles, Griffen and Bartholomew’s (1994) attachment questionnaire was used as the model for the SESQ. Accordingly, the SESQ consisted of three parts. First, four paragraphs were provided to represent each of our social exchange style exemplars. In the
first part of the questionnaire, participants were asked to select the style that best represented them, and in the second part of the measure participants were asked to use a 7-point Likert scale to indicate the extent to which each of the prototype paragraphs corresponded with their own way of interacting with social exchange partners. For the third part of the questionnaire, the four paragraphs were decomposed into 30 items. Participants were asked to rate the extent to which each item described their approach to interacting with allies. All subject ratings for this measure were done on 7-point Likert scales ranging from 1 – not at all like me, to 7 – very much like me.

The ASQ diverged from the attachment measure in three ways. First, instead of 5-point Likert Scales, 7-point Likert scales were used to increase variability in responding. Additionally, before filling out the questionnaire, participants were asked to write down the initials of three people they considered “allies.” The purpose of this was to prime memories of interacting with allies rather than intimate others. Last, because it was anticipated that people would have different implicit definitions of alliances, a standard definition was provided. This definition has been adapted with later versions of the questionnaire. We believe that providing a definition of allies is essential in order to avoid having people confound the ways in which they interact with close friends when considering their typical social exchange styles. This is not meant to imply that exchange dynamics are absent in close relationships. Rather, we assume that a person’s typical way of interacting with a close friend reflects both their social exchange style, and their attachment style. For the purposes of this scale, we
hoped to focus specifically on social exchange styles. The original definition provided for allies was:

[Allies] are people with whom you have a relationship in which you both contribute something (the “cost” of the relationship) in the expectation of gaining something (the “benefit” of the relationship). Allies do not include people with whom you have relatively intimate, emotionally involved relationships such as family members, close friends, or romantic partners. Examples of allies include casual friends, people with whom you work on group projects at school or at work, partners in businesses, and on-going business associates such as vendors or consultants. We call these relationships “alliances.” It is important to note that alliances do not have to be manipulative and exploitive in the “Survivor” style. Furthermore, none of the personality types described below is necessarily more beneficial than the others; each can be adaptive.

The Evolution of the Social Exchange Model

In a study of 156 McGill Undergraduate students that preceded this dissertation, the initial two-factor model was partially confirmed (Leybman, et al., 2011a). A Principal Components Analysis (PCA) resulted in two factors, which differed only slightly from the hypothesized factors. The hypothesized benefit-seeking factor included themes of fairness, as well as focusing on forming and maintaining social exchange relationships. We chose to rename this factor Equitable Alliance Building (EAB). The final EAB scale consisted of 11 items. The hypothesized cost-vigilance factor included a tracking component, a cost-minimizing component and an assertiveness component. We renamed this factor Vigilant Alliance Management (VAM). The final VAM scale consisted of nine items. These subscales of SESQ had Cronbach alphas greater than .80, demonstrating good internal consistency.

An important element of constructing a scale is focusing attention on construct validity, which is essentially a process of accumulating evidence that a construct is behaving as it should according to its theoretical definition (Campbell & Fiske, 1959). Discriminant validity is one form of construct validity, which
refers to demonstrating that a construct is independent of other traits to the extent that the new trait is justified, and that it is not mistakenly measuring a construct that it was not meant to assess. The SESQ has demonstrated good discriminant validity in that it does not overlap extensively with the five-factor personality traits or attachment styles (Leybman et al., 2011a). Additionally, we found that the SESQ was not highly related to social desirability (Leybman et al., 2011a).

Construct validity also refers to whether a construct is related to theoretically similar constructs in the ways one might expect (Campbell & Fiske, 1959). For example, when designing a measure of depression, one would expect that it was moderately correlated with anxiety. We hoped to demonstrate this form of validity by showing that Social Exchange Styles related to other variables in predictable ways. We found that EAB correlated with extraversion, agreeableness, and that VAM correlated with disagreeableness and avoidant attachment (Leybman et al., 2011a). These relationships give insight into the motivations, and potentially into the partner value related to each of the social exchange dimensions. Additionally, we found a moderate relationship between VAM and social desirability; the lower a person was in Impression Management, and the higher a person was in Self-Deception, the more likely they were to report high levels of VAM. We believe that these relationships provide insight into the psychology of VAM. People who tend to be direct about wanting to profit in exchange relationships and who cut off these relationships easily cannot be overly concerned with presenting themselves to others in a positively biased way. Moreover, having a deceptively positive view of oneself could lead to feeling a
sense of deserving more than others within exchange relationships, leading to behaviours such as tracking and cost-minimizing.

After the initial validation study was completed, a second study was designed to demonstrate the utility of the SESQ by applying it to a simulated work environment. In this study, 45 groups of four female participants were administered the SESQ and worked together on a social dilemma group task. Group members were asked to rate their subjective performance on the task, and six blind raters assessed their performance as an objective measure. We found that EAB was positively related to subjective performance in that both a group’s mean tendency and an individual’s tendency, relative to the group, to use EAB strategies were related to feeling satisfied with the group’s product (Leybman et al., 2011). VAM was not related to subjective performance, but instead predicted higher scores in overall objective performance and various dimensions of objective performance such as technical quality and usefulness of the product. This study demonstrated that in addition to being a valid measure, the SESQ could be useful in terms of predicting important outcomes in at least one context. The two-factor model of social exchange styles has been confirmed in various samples.

Our intent in creating the initial SESQ was to produce a two-factor model, but we also expected that our four prototypical styles (exploiter, fair-trader, helper and individualist) would make up a set of lower-order factors. Although our data were not consistent with this hypothesis, exploratory analyses suggested that we could indeed explain more variance in people’s social exchange behaviour by
expanding out model. To test this idea, I set out to create a new, more comprehensive model of social exchange styles that would explain more of people’s social exchange behaviours. The research presented in this dissertation includes the development of this new model, the development of a scale to assess individual differences related to the new model, and an exploration of one of the dimensions in the new model.

**Present thesis**

The overall objective of this dissertation was to build towards a theory of personality based on evolutionary psychology. More specifically, the purpose of this dissertation was to present a new model of social exchange styles and to provide a well-validated tool to assess individual differences related to this model.

Based on the complexity of behaviour in the social exchange domain, I proposed that social exchange styles would be better explained with an expanded model, which was more comprehensive than the initial two-factor model. I also sought to design a revised social exchange styles questionnaire (SESQ-II) to assess this more comprehensive model. Article 1 presents the new model and questionnaire and presents two studies in which we work towards validating the revised social exchange styles measure.

Article 2 brings the focus away from the questionnaire and focuses more on exploring one dimension of social exchange in order to better understand the construct. In this article the focus is on understanding the adaptive function of monitoring costs and benefits in exchange relationships. This was meant to begin to build an understanding of how social exchange styles fit into our evolutionary
lineage, and was meant to provide insights into the cognitions and motivations that are related to this social exchange dimension. Additionally, Article 2 explores the way that social exchange styles influence a person in their current environment with a focus on individual differences in emotional responses to receiving social support. The research presented in both articles is intended to contribute to developing the content and process components of the social exchange styles model, and to provide insights into ways that the SESQ-II could be a useful tool in a variety of settings.
ARTICLE 1

A FIVE-DIMENSIONAL MODEL OF INDIVIDUAL DIFFERENCES IN SOCIAL EXCHANGE STYLES

Michelle J. Leybman\textsuperscript{1}, David C. Zuroff\textsuperscript{1}, & Marc A. Fournier\textsuperscript{2}

\textsuperscript{1}McGill University
\textsuperscript{2}University of Toronto Scarborough

Abstract

An evolutionary psychology framework was used to develop a five-factor model of individual differences in the domain of social exchange that built on a prior two-factor model (Leybman, Zuroff, Fournier, Kelly, & Martin, 2011). Two studies examined the factor structure of the revised Social Exchange Styles Questionnaire (SESQ-II), the reliability and validity of its five scales, and the relationship between social exchange styles (SESs) and social support. Principal components and principal factor analyses of the SESQ-II in 226 undergraduates found five social exchange dimensions: Tracking, Fairness, Individualism, Benefit-Seeking, and Overinvestment. These scales showed good internal consistency and retest reliability. Multiple regression analyses demonstrated that SESs, while distinct from other personality variables, had expected relationships with several variables and predicted social support patterns.

Keywords: personality; evolutionary psychology; reciprocity; scale development; social support
A Five-Dimensional Model of Individual Differences in Social Exchange Styles

Introduction

The field of evolutionary psychology has grown rapidly in influence over the past two decades, yet it has not been applied to its full potential in the area of personality psychology. Recently, Zuroff, Fournier, Patall, & Leybman (2010) suggested that applying an evolutionary psychology framework to understanding individual differences could lead to a unified theory of personality that focused on both content (a description of personality) and process (how personality is acquired and influences behaviour). They proposed developing this theory by identifying individual differences within the evolved systems that regulate social behaviour. The present article focuses on individual differences in the domain of social exchange relationships.

Evolutionary Psychology

Our research has been influenced by the theme of domain specificity within evolutionary psychology, which proposes that recurrent problems in living in the environment of evolutionary adaptiveness can be categorized into distinct domains (e.g., Bugental, 2000). The adaptive problems of each domain resulted in a corresponding set of evolved psychological mechanisms that guide our current thinking and behaviour. Bugental suggested that human behaviour evolved as a response to problems in the domains of attachment, mating, social rank, coalition groups, and reciprocity/social exchange. To date, few personality measures have been developed with an explicitly evolutionary rationale. Thus, Zuroff and colleagues (2010) proposed identifying domain-specific personality variables,
beginning with the social rank domain. Leybman, Zuroff, Fournier, Kelly, and Martin (2011) continued by examining individual differences in the social exchange domain.

Leybman and colleagues (2011) found two dimensions of individual differences in social exchange styles (SESs): Equitable Alliance Building (EAB: the tendency to seek benefits, favour equity, and be willing to invest in establishing and maintaining social exchange relationships) and Vigilant Alliance Management (VAM: the tendency to monitor costs and benefits in exchange relationships, be firm in negotiations with exchange partners, and be willing to terminate exchange relationships). EAB and VAM were distinct from NEO traits and attachment styles, but showed predictable relationships with these variables; i.e., extraverted and agreeable people were higher in EAB, whereas disagreeable and avoidantly attached people were higher in VAM. Moreover, EAB and VAM predicted subjective and objective performance in small work groups. In this article we propose a more comprehensive alternative to Leybman and colleagues’ two-dimensional model and provide evidence for the reliability and validity of a measure of our new model.

Social Exchange Styles

There are a handful of scales that measure individual differences in the area of social exchange, such as the Personal Norms of Reciprocity Questionnaire (PNRQ; Perugini, Gallucci, Presaghi, & Ercolani, 2003). Leybman and colleagues (2011) developed the Social Exchange Style Questionnaire (SESQ) as a measure of individual differences within the social exchange domain in which social
exchange styles SESs were defined in evolutionary psychological terms and covered a broader range of the domain than previous scales. Many personality measures offer both higher- and lower-order factors so that users of the scales can decide whether to pursue parsimony or comprehensiveness. Leybman and colleagues (2011) anticipated that EAB and VAM would emerge from four lower-order factors: exploitiveness (promoting benefits while seeking to minimize costs), fairness (promoting benefits while assuming costs), helping (assuming costs without necessarily expecting or promoting benefits), and individualism (disinterest in alliances with little investment and little benefit).

Leybman and colleagues (2011) were able to identify two broad factors in the SESQ, but they did not obtain the anticipated lower-order styles. We continue to regard the original model as useful and parsimonious, but we see behaviour in this domain as too complex to be fully described by two factors. Thus, we created a revision of the SESQ in hopes of capturing the exploitiveness, fairness, helping, and individualism factors, as well as the two broad factors. To add items to the SESQ-II, we identified facets of the four hypothesized factors: goals/expectations about benefits, goals/expectations about costs, beliefs/behaviours related to maintenance of exchange relationships, negotiation styles in exchange relationships, and beliefs/behaviours related to monitoring costs and benefits. We wrote items for each factor that fit within these facets. The final pool included 75 items.

In addition to creating a more comprehensive supplement to our two-factor model, we hoped to differentiate our scale from the most commonly
measured five-factor personality traits. We also wanted to differentiate our scale from another measure of individual differences in approaches to reciprocity, the PNRQ (Perugini et al., 2003). Finally, we wanted to examine the relationships of our dimensions with other relevant variables. We were particularly interested in relationships with the interpersonal variables from the NEO (Neuroticism, Extraversion, and Agreeableness), variables that would lend insight into behavioural motivations (perceptions of one’s value to others and of others’ benevolence), and variables that relate to the adaptive function of social exchange styles (social support). Hypotheses about these relationships will be noted in the Results section.

Objectives

The overarching goal of this research was to examine the reliability and validity of the newly developed SESQ-II. To do this, we had four specific objectives: (1) examine the dimensions of the SESQ-II; (2) test the stability of SESs at 2-week and 2-month follow-up; (3) examine construct validity by looking at the relationships between SESs and other personality variables, as well as variables related to perceptions of self and other; (4) demonstrate the utility of the SESQ-II by exploring its prediction of social support.

Study 1

We hypothesized four factors that would reflect the themes of exploitiveness, fairness, helping, and individualism. Moreover, although we conceptualized SESs as dispositional, we expected that variability emerges as individuals adjust their behaviour to different exchange situations, so we
hypothesized moderate temporal stability at 2-week and 2-month follow-up.

Finally, in examining the relationships between our variables and other variables, we expected to show that there was only moderate overlap between our dimensions and other variables, particularly the PNRQ, given its focus on styles of approaching reciprocity. More specific hypotheses regarding construct validity are noted prior to reporting each analysis.

Methods

Participants and Procedure

We recruited 226 English-speaking undergraduate students from McGill University (149 women, 77 men) using classified advertisements on McGill’s website and Craigslist. Participants completed a battery of questionnaires during a 1-hour lab session and were contacted again after 2 weeks and 2 months to complete one questionnaire again. One hundred and thirty-two participants (97 women, 35 men) were retained for the 2-week retest session, and 100 participants (70 women, 30 men) were retained for the 2-month retest session. Participants were compensated $15 for the lab session, and $5 for completed retest sessions.

Measures

Revised Social Exchange Styles Questionnaire (SESQ-II). Means and Cronbach alphas for all measures are reported in Table 2.1. The 75 items were rated on a Likert scale, ranging from 1 (not at all like me) to 5 (very much like me). Before completing the questionnaire, participants were asked to write down the initials of three people they consider social exchange partners. Moreover, a standard definition of an alliance was provided. The term alliance is used
throughout the scale instead of the term *social exchange relationship* in attempt to circumvent the aversion people might have to conceptualizing their relationships as motivated by exchange.

*Personal Norms of Reciprocity Questionnaire (PNRQ; Perugini et al., 2003).* This 27-item measure assesses three dimensions of individual differences in approaching reciprocity: belief in reciprocity (expectation that others reciprocate one’s behaviours), positive reciprocity (reciprocating positive acts), and negative reciprocity (reciprocating negative acts). Cronbach alphas for these factors were .62, .76, and .84, respectively. Items are rated on a 7-point Likert scale. This scale has demonstrated good construct validity (Perugini et al., 2003).

*NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992).* This 60-item measure assesses Neuroticism, Extraversion, Openness, Conscientiousness, and Agreeableness, but we focused on Neuroticism, Extraversion, and Agreeableness given their relevance to social exchange. Cronbach alphas for these factors were .88, .82, and .77, respectively. Participants were asked to rate each item on a 5-point Likert scale. This measure has been found to have good construct validity (Young & Schinka, 2001), and each subscale demonstrates good internal consistency (Murray, Rawlings, Allen, & Trinder, 2003).

*Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965).* This is a 10-item measure of global feelings of self-worth or self-acceptance that uses a 5-point Likert scale. The Cronbach alpha for self-esteem was .90. This scale has good internal consistency and retest reliability (Fleming & Courtney, 1984), and is valid (Lorr & Wunderlich, 1986).
Table 2.1

Descriptive Statistics of all Variables and Pearson Correlations with SESQ-II

<table>
<thead>
<tr>
<th>Variable</th>
<th>Tracking</th>
<th>Fairness</th>
<th>Individualism</th>
<th>Benefit-Seeking</th>
<th>Overinvestment</th>
<th>M</th>
<th>SD</th>
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<tr>
<td>2-Week Follow-up</td>
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<td>.08</td>
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Note. * p < .05. ** p < .01. *** p < .0001.
Philosophies of Human Nature Scale (POHNS; Wrightsman, 1964). The POHNS measures perceptions of other people on six dimensions: altruism, trustworthiness, independence, strength of will and rationality, simplicity and complexity, and variability among people. We focused on perceptions of others’ benevolence which are assessed by the altruism and trustworthiness scales, each of which consists of 14 items rated on 7-point Likert scales. Cronbach alphas for these variables were .75, and .83, respectively.

Results and Discussion

Social Exchange Dimensions

Our first objective was to examine the dimensional structure of the SESQ-II. A principal components analysis (PCA) with a promax rotation was conducted on the 75 items. We used a promax rotation to assess possible correlations between the factors. The scree plot suggested a 7-factor solution, but because only 3 items loaded onto the seventh factor, we discarded it and interpreted a six-factor solution. The six factors reflected themes of: (1) monitoring costs and benefits, (2) favouring equity and fairness, (3) preference for self-reliance and low investment, (4) reluctance to abandon exchange relationships, (5) desire to benefit as much as possible, and (6) investing in exchange relationships without requiring equal investments from others. We found that the third and fourth factors were substantially correlated, $r(224) = -0.47, p < .001$. Because of the magnitude of this correlation, and because we had not hypothesized a relationship-maintenance factor, we do not report the results related to the fourth factor.
Approximate factor scores were created by averaging the eight highest loading items for each factor. We did not have a minimum factor loading score and we did not omit items if they cross-loaded across factors, preferring to keep more items in this phase of item selection. Five items had loadings higher than .30 on more than one item. We then conducted a principal factor analysis (PFA) using a Promax rotation on the 40 items that emerged from the initial screening. The PFA confirmed our five-factor model with each item loading onto the same factor that it did in the initial PCA. The lowest loading was .34 for the last item on the Benefit-Seeking factor. Finally, we conducted a Confirmatory Factor Analysis (CFA) on item parcels that were constructed by balancing the loadings from the scale (as per Little, Cunningham, Shahar and Widaman, 2002) with three parcels per factor entered into the model. This model had a good fit, GFI = .91, CFI = .93, RMSEA = .07. These results led us to adopt the five-factor model with eight items per scale as our final model. We named the factors: Tracking, Fairness, Individualism, Benefit-Seeking, and Overinvestment. Cronbach alphas were .84, .81, .81, .75, and .68, respectively. The items that map onto each dimension and their factor loadings are available upon request. The inter-factor correlations for the five-factor model are presented in Table 2.2 (all <.35). The only significant gender difference was for Fairness, $F(1, 224) = 6.71, p < .05$, with women endorsing more Fairness than men.

The content of the five factors was largely consistent with our hypothesized model, but some differences arose. The Fairness and Individualism dimensions resembled our hypothesized factors, with Fairness reflecting a desire
Table 2.2

*Inter-factor Correlations, and Second-Order PCA Loading Values*

<table>
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<th>Tracking</th>
<th>Fairness</th>
<th>Individualism</th>
<th>Benefit-Seeking</th>
<th>Overinvestment</th>
<th>EAB</th>
<th>VAM</th>
<th>Second Order Factor 1</th>
<th>Second Order Factor 2</th>
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<td>.12</td>
<td>.63 ***</td>
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<td>.34 ***</td>
<td>.02</td>
<td>.81 ***</td>
<td>-.20 *</td>
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<td>.79</td>
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<tr>
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<td></td>
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<td>.13</td>
<td>.29 ***</td>
<td>.52</td>
<td>.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overinvestment</td>
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<td></td>
<td>.13</td>
<td>-.30 ***</td>
<td></td>
<td></td>
<td></td>
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<td>-.58</td>
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</tbody>
</table>

*Note.* *p < .05.  **p < .01.  ***p < .0001. Only factor loadings > .50 are reported.*
for equal relationships and a willingness to invest in order to promote mutual benefits, and Individualism reflecting a preference to rely on oneself and avoid investments in exchange relationships. The content of the exploitiveness dimension shifted towards a more specific focus on one’s own benefits in a social exchange relationship, and the content of the helping dimension shifted towards a specific focus on one’s own investments in a social exchange relationship. Finally, the Tracking facet emerged as a unique dimension instead of merging into the existing factors.

Next we explored the relationship between our new five factors and the two factors initially reported by Leybman and colleagues (2011). A second-order PCA with a promax rotation on the five factors of the SESQ-II disclosed two higher-order factors. The first higher-order factor correlated with EAB, $r(224) = .84, p < .001$, and the second correlated with VAM, $r(224) = .63, p < .001$ showing a strong relationship with the two factors from the first version of our scale. To further examine the relationship, we used Structural Equation Modeling to determine whether the two higher-order factors and the two original factors reflected two latent variables. Indeed, this model had a good fit on two of the three commonly used fit indices in CFA, $GFI = .91$, $CFI = .91$. The third commonly used indicator did not indicate good fit, $RMSEA = .33$, but the $GFI$ and $CFI$ led us to accept the model. Factor loadings for the higher-order factors and correlations between our initial factors and the new factors are reported in Table 2.2.
Test-Retest Reliability

Our second objective was to test the stability of SESs. Pearson correlation coefficients were calculated to examine the retest reliability at 2-week and 2-month follow-up (Table 2.1). The results were consistent with our prediction of moderate stability, with correlations ranging from .64 (Overinvestment) to .74 (Individualism) at 2-week follow-up, and from .50 (Overinvestment) to .75 (Individualism) at 2-month follow-up. Paired samples t-tests were performed between each factor at the initial session, with the same factor at 2-week follow-up and 2-month follow-up. Only one of the ten t-tests performed was significant, indicating a slight decrease in Fairness from the initial session to the 2-month follow-up, \( t(99) = 2.08, \ p < .05 \).

Construct Validity

Our third objective was to examine construct validity. Correlations were small to moderate in magnitude, demonstrating good discriminant validity; the highest observed correlation was between Fairness and Positive Reciprocity, \( r(224) = .40, \ p < .001 \) (Table 2.1). Multiple regressions were performed with Tracking, Fairness, Individualism, Benefit-Seeking, and Overinvestment as dependent variables to examine the relationship of SESs with other personality variables and with a person’s representation of self and others. Four separate analyses were conducted using the following sets of predictors: (1) personal norms of reciprocity, (2) NEO traits, (3) self-esteem, and (4) philosophies of human nature. Predictors were entered simultaneously into models. Interactions
with gender were tested, but none were significant so they were deleted from all models.

*Personal norms of reciprocity.* Because of its relationship to the social exchange domain, we were interested in demonstrating that there would be only small to moderate relationships between the PNRQ and our scales. The overall models were significant ($p < .05$) for predicting Tracking ($R^2 = .15$), Fairness ($R^2 = .26$), and Individualism ($R^2 = .04$). These results confirm that SESs are not redundant with other measures of individual differences in reciprocity.

*Personality traits.* We explored the relationships between SESs and the interpersonal NEO traits (Neuroticism, Extraversion, and Agreeableness). We understand Tracking as a response to anxiety about being cheated in exchange relationships; we therefore expected it to be related to Neuroticism. Additionally, because both Fairness and Benefit-Seeking are related to obtaining resources from others, we expected them to be related to Extraversion, as it is the Big Five trait that encompasses assertiveness. We expected Individualism to be negatively related to Extraversion, which encompasses warmth and gregariousness, because Individualism is partly defined by avoidance of exchange relationships. Finally, we expected a willingness to invest in exchange relationships to be predicted by Agreeableness. Thus we anticipated that Fairness and Overinvestment would be predicted by Agreeableness, while Individualism and Benefit-Seeking would be negatively related to this variable.

The overall models were significant (all $p's < .001$) for predicting Tracking ($R^2 = .11$), Fairness ($R^2 = .13$), Individualism ($R^2 = .17$), and Benefit-
Seeking ($R^2 = .07$). Tracking was positively predicted by Neuroticism, $\beta = .15$, $p < .05$, and negatively predicted by Agreeableness, $\beta = -.37$, $p < .001$. Fairness was positively predicted by Agreeableness, $\beta = .40$, $p < .001$. Individualism was negatively predicted by both Extraversion, $\beta = -.50$, $p < .001$, and Agreeableness, $\beta = -.23$, $p < .05$. Finally, Benefit-Seeking was positively predicted by Extraversion, $\beta = .24$, $p < .001$.

In summary, as expected, people high in Tracking tended to be more neurotic. Additionally, as expected, people high in Fairness tended to be agreeable, while people high in Individualism tended to be disagreeable. An unexpected finding was that people high in Tracking were disagreeable; this gives us insight into the interpersonal patterns that relate to this SES. Finally, as predicted, people high in Benefit-Seeking were more extraverted, while people high in Individualism were more introverted.

**Perceptions of self and others.** Analyses related to one’s perceptions of themselves and others were conducted to contribute to understanding the motives underlying different SESs. We reasoned that people with high self-worth would see themselves as valuable trading partners and would therefore use strategies focused on receiving benefits. People with positive self-perceptions would expect that others would want to share resources with them. Similarly, we hypothesized that low self-worth would predict strategies in which people focus on investing resources to be perceived as valuable exchange partners, anticipating that people with low self-esteem would feel they could not offer anything to others unless it was material or concrete. Consistent with these hypotheses, Benefit-Seeking was
positively predicted by self-esteem, $\beta = .19$, $p < .01$, and Overinvestment was negatively predicted by self-esteem, $\beta = -.24$, $p < .01$.

Regarding perceptions of others, we expected perceptions of benevolence to motivate strategies that focus on Fairness and Overinvestment, whereas we expected negative perceptions to result in strategies that involved monitoring others’ behaviour (Tracking), benefiting without investing (Benefit-Seeking), or being detached from exchange partners (Individualism). We therefore tested models in which perceptions of Altruism and Trustworthiness predicted the SESQ-II dimensions. The overall models were significant (all $p$’s < .05) for predicting Tracking ($R^2 = .06$), Fairness ($R^2 = .03$), Individualism ($R^2 = .07$), and Benefit-Seeking ($R^2 = .04$). Tracking was negatively predicted by viewing people as trustworthy, $\beta = -.19$, $p = .05$. Individualism was negatively predicted by viewing people as altruistic, $\beta = -.31$, $p < .01$. Lastly, Benefit-Seeking was negatively predicted by viewing people as trustworthy, $\beta = -.28$, $p < .05$, and was positively predicted by viewing people as altruistic $\beta = .29$, $p < .05$. Because the Benefit-Seeking results were inconsistent with the zero-order correlations, they were attributed to suppression effects. In summary, our hypotheses about people’s beliefs about others were partially confirmed in that people who viewed others as untrustworthy were more likely to use Tracking or Benefit-Seeking strategies, and people who viewed others as less altruistic were likely to use Individualism strategies.
Study 2

Our final objective was to demonstrate the utility of the SESQ-II by exploring its ability to predict perceived and received social support. Perceived support refers to one’s belief that they could have access to support if they needed it, while received support is a measure of supportive behaviours provided to someone in a given time frame. We anticipated that expecting/seeking benefits (Fairness and Benefit-Seeking) would lead to increased relational benefits because people using these strategies would surround themselves with others who satisfied their expectations. On the other hand, we anticipated that focusing on monitoring benefits (Tracking) would have the ironic consequence of reducing relational benefits. We also expected that either detaching from social exchange relationships or investing without requiring reciprocity would result in less relational satisfaction. In terms of incremental validity, we expected that the new model would account for more variance in these social outcomes than the old two-factor model, and that the SESQ-II would significantly improve a model in which Neuroticism, Extraversion, and Agreeableness predicted social support.

Methods

Participants and Procedure

We recruited 100 English-speaking undergraduate students from McGill University (50 men; 50 women) using classified advertisements on McGill’s website and Facebook. The study lasted one week, involving an initial lab session and a daily diary component. At the lab session, participants completed the
SESQ-II, as well as the Neuroticism, Extraversion, and Agreeableness scales from the NEO-FFI on Survey Monkey, an online questionnaire administration program.

For seven days beginning the day after the lab session, participants were emailed a link to complete a social support questionnaire on Survey Monkey. Social support was assessed using the Social Provisions Scale (SPS; Cutrona & Russell, 1987), which assesses the extent to which individuals feel that, in times of stress, others provide them with six social provisions. The current study administered an amended 3-item version of the SPS that asked participants to rate the extent to which they perceived and received the three provisions: guidance (“To what extent did another person(s) provide you with advice or guidance today?”), reliable alliance (“To what extent did another person(s) come to your assistance today?”), and emotional closeness (“To what extent did another person(s) provide you with a sense of emotional security and well-being today?”). These three items are frequently combined to measure social support (e.g., Cutrona, 1989).

A research assistant emailed a link to participants every evening at 6pm and participants were asked to complete the questionnaire between 6pm and 6am each day. Diaries completed after 6am were considered missed. Participants were told that they could miss a maximum of one diary and make it up on the eighth day. Participants were compensated $16 for the initial baseline session, $2 for each completed online diary and a $20 bonus for completing seven diaries in eight days.
Results and Discussion

*Predictive Validity*

We aggregated both perceived and received social support scores across the seven diaries. Next, we conducted two multiple regressions in which all five SES dimensions were entered simultaneously as predictors. Interactions with gender were tested but none were significant, so gender was deleted from all models. SESs were significant in predicting both perceived ($R^2 = .24, p < .001$) and received ($R^2 = .14, p < .05$) social support. Specifically, Tracking, $\beta = -0.43$, $p < .01$, and Overinvestment, $\beta = -0.19$, $p < .05$, each predicted perceiving less social support, while Fairness predicted perceiving more support, $\beta = 0.21$, $p < .05$. Received support was negatively predicted by Individualism, $\beta = -0.35$, $p < .01$.

*Incremental Validity*

To examine the utility of the SESQ-II, we compared the original two-factor model with our expanded five-factor model. We found that while the two-factor model accounted for 11% of the variance in perceived support, and 5% of the variance in received support, the five-factor model accounted for 20% and 9% of the variance in these variables, respectively, based on the adjusted $R^2$. Finally, we conducted a hierarchical regression to determine whether our variables predicted social support beyond Neuroticism, Extraversion, and Agreeableness. For both perceived and received support we entered the NEO variables in a first step, and then entered our five SESQ-II factors. For perceived support, the $R^2$ increased from .30 to .40 when the SESQ-II variables were included, $F(8, 92) = 7.58, p < .001$. For received support, the $R^2$ increased from .10 to .18, $F(8, 92) = $
1.21, although this test was not significant. Overall, our hypotheses were partially confirmed. As expected, Fairness resulted in more relational satisfaction, whereas Tracking, Individualism and Overinvestment resulted in less. Moreover, we found an advantage to using the more comprehensive model compared to the two-factor model and showed that the SESQ-II offered an advantage in predicting perceived social support over using NEO traits alone.

General Discussion

Summary

We sought to elaborate a model based on evolutionary psychology that would explain individual differences in approaching social exchange relationships. Specifically, we sought to provide a more comprehensive alternative to our two-factor model of SESs. The results generally supported a five-factor model, with the original two factors emerging as higher-order factors. Moreover, our results indicated good convergent, discriminant, and incremental validity and show that SESs predict patterns of social support. Although more research is needed to document the origins and implications of SESs, these results demonstrate the potential for a personality psychology that uses evolutionary psychology as a starting point.

Limitations

Our results provide encouraging evidence for the reliability and validity of the SESQ-II, yet some limitations should be noted. First, research is needed to confirm the factor structure of the SESQ-II. Second, the extent to which SESs are generalizable across relationships has not yet been explored. Third, the question
remains whether scores on our scale will predict overt behaviour in exchange situations. Finally, as we have previously noted, other existing measures target constructs that have some overlap with ours.

Future directions

Several lines of research could stem from this study. In previous work, we described potential applications of the SESQ in the areas of organizational and clinical psychology (Leybman et al., 2011). Other directions for future research include focusing on moderators of social exchange styles, such as holding compassionate goals versus goals focused on building reputation, and using game paradigms from behavioural economics that could permit experimental investigations of the behavioural correlates and situational moderators of SESs.
PREFACE TO ARTICLE 2

The overarching aim of this thesis is to build towards a unified theory of personality that is based in evolutionary psychology. I focus on identifying individual differences in the social exchange domain. In Article 1, my colleagues and I presented a new model of social exchange styles in which individual differences in approaching exchange relationships are conceptualized in terms of five factors: Tracking, Fairness, Individualism, Benefit-Seeking, and Overinvestment. We also presented the revised Social Exchange Styles Questionnaire (SESQ-II), which was designed to assess people on these five dimensions. The full SESQ-II is provided in Appendix A. We tested the reliability and validity of this new scale, finding that the SESQ-II had the expected level of retest reliability and that our five dimensions held predictable relationships with other variables such as personal norms of reciprocity, five-factor personality traits, and beliefs about human nature. In Article 1 we also showed that social exchange styles predicted both perceived and received social support. This is particularly relevant because the hypothesized function of the social exchange domain is to manage costs and benefits in exchange relationships and to acquire resources.

Because this is a newly formed model, there are still several gaps in the literature that need to be addressed. I chose the next steps in this program of research based on the goal of better understanding the process and content components of the social exchange styles model. Because the model is rooted in evolutionary psychology, we have some sense of the phylogeny of the individual differences within the model. However, I found it important to also explore the
development and maturing of these dimensions across a person’s lifespan. This
goal is particularly relevant in an evolutionary psychology framework given the
common view that personality differences are not adaptively important (Tooby &
Cosmides, 1990). Additionally, to build on the content component of the model, I
found it important to elaborate the link between our dimensions and social support.
Specifically, knowing how people reacted emotionally to receiving social support
would help build an understanding of how our dimensions affect a person in their
current environment and could further link our dimensions to their adaptive
function. Eventually, these issues will need to be explored for each of our factors.
However, trying to understand them all at once is daunting and results in too
much information to be digestible, so I decided to focus my attention on one
factor. I chose Tracking because it relates well to cheater-detection, which is
already frequently discussed in social exchange literature (e.g., Cosmides &
Tooby, 1992). Additionally, based on Article 1, it is the most robust factor.
Article 2 presents two studies to address these gaps with respect to Tracking: one
in which the development of Tracking is explored, and one in which the affective
consequences of Tracking after receiving social support are explored.
ARTICLE 2

KEEPING SCORE: THE DEVELOPMENTAL ANTECEDENTS AND AFFECTIVE CONSEQUENCES OF SOCIAL EXCHANGE TRACKING

Michelle J. Leybman¹, David C. Zuroff¹, Marc A. Fournier²,
Daniel C. Kopala-Sibley¹, & Nora Hope¹

¹McGill University
²University of Toronto Scarborough

Leybman, M. J., Zuroff, D. C., Fournier, M. A., Kopala-Sibley, D. C., & Hope, N.
(under review). Keeping score: The developmental antecedents and affective consequences of social exchange Tracking.
Abstract

Building on evolutionary psychology and biological markets theory, we conceptualized social exchange styles in terms of five dimensions of individual differences in approaching exchange relationships. Tracking is one of these dimensions and is defined as the frequency and precision with which people monitor costs and benefits in their exchange relationships. In two studies, we tested theoretically-derived developmental antecedents and affective consequences of Tracking. In Study 1, a retrospective questionnaire study of 200 college students, multiple regression analyses demonstrated that Tracking is predicted by recalled experiences of low access to resources relative to peers, having low control over resources, and parental overprotectiveness. Additionally, low parental warmth predicted Tracking levels, but only if people were also spoiled. In Study 2, a 7-day daily diary study of 100 students, multilevel modeling showed that Tracking predicted high Joviality on days when people felt they had received more social support than usual, and high Hostility on days when they received less support than usual. These affective responses were distinct from other emotions such as serenity, fear, and guilt. Theoretical questions and future research directions are discussed.

Keywords: personality, evolutionary psychology, social-exchange, personality development, social support
Keeping Score: The Developmental Antecedents and Affective Consequences of Social Exchange Tracking

The systematic application of evolutionary psychology to the study of personality has the potential to contribute to a deeper understanding of human behavior and to transform personality research (Buss, 1999; Buss, 2009). Zuroff, Fournier, Patall, and Leybman (2010), seeking to integrate evolutionary psychology with personality psychology, suggested that a comprehensive and unified theory of personality could result from identifying and measuring domain-specific individual differences in behavioural strategies that are used in the various domains of social life, including attachment, social rank, coalitions (i.e., in-group and out-group dynamics), mating, and reciprocity (Bugental, 2000). Zuroff and colleagues (2010) began their project by focusing on individual differences in how people pursue, maintain, and relinquish social rank. Leybman and colleagues (Leybman, Zuroff, Fournier, Kelly, & Martin, 2011a; Leybman, Zuroff, & Fournier, 2011b) continued by focusing on individual differences within the reciprocity domain, which is defined by Bugental (2000) as “the provision of equivalent benefits (including affective benefits) over a period of time between functional equals” (p.13). We refer to this as the social exchange domain. In this article, we examine the developmental antecedents of social exchange styles and explore the relationship between social exchange styles and affective reactions to social support.

An early model of social exchange styles (Leybman et al., 2011a) proposed that behaviours related to managing costs and benefits in exchange
relationships could be described as varying along two dimensions: *Equitable Alliance Building*, the tendency to seek benefits while favouring overall equity and the willingness to invest in establishing and maintaining social exchange relationships; and *Vigilant Alliance Management*, the tendency to monitor costs and benefits in exchange relationships, to be firm in negotiations with exchange partners, and to be willing to terminate exchange relationships. A later model (Leybman et al., 2011b) provided a more comprehensive description of social exchange styles and their variation along five dimensions: Tracking, Fairness, Individualism, Benefit-Seeking, and Overinvestment. The two factors from the initial model emerged as higher order factors within the five-factor model. The Social Exchange Styles Questionnaire-II (SESQ-II) was developed to assess social exchange styles in accordance with both models.

Tracking refers to monitoring short- and long-term costs and benefits within social exchange relationships and is the focus of this article. The SESQ-II includes eight tracking items. Sample items include, “I pay close attention to how much an alliance is costing me” and “I focus on monitoring long-term benefits in alliances.” Tracking relates to elements of the *cheater detection* mechanisms that Cosmides and Tooby (1992) postulated to have evolved to support reasoning about social exchange. These are an example of *evolved psychological mechanisms* (EPMs), which are adaptations that guide our thinking and behaviour, and are specialized to give people the ability to infer whether a person is cheating or likely to cheat within an exchange. Cheater detection EPMs are also postulated to result in physiological activity in response to specific exchange-
related inputs from the environment (Buss, 2004). We postulate that the frequency, diligence, and precision with which people engage in cheater detection varies between individuals and can be measured on a trait level. Our Tracking dimension is intended to represent this individual difference variable.

Tracking measured using the SESQ-II has demonstrated good retest reliability ($r = .68, p < .001$ at 2-week follow-up, and $r = .61, p < .001$ at 2-month follow-up) and a good level of internal consistency, with Cronbach alphas ranging from .84 to .91 in various studies (e.g., Leybman et al., 2011b). Additionally, Tracking has demonstrated good discriminant validity; it has been found to be distinct from attachment styles (an individual difference construct from another evolutionary domain), five-factor traits, and personal norms of reciprocity (an individual difference construct related to reciprocity). Tracking has also demonstrated good construct validity. In one study, it was related to high levels of Neuroticism and low levels of Agreeableness, as well as high levels of viewing others as untrustworthy. It was not related to whether a person receives social support, but did predict perceiving less support (Leybman et al., 2011b). In other words, although people high in Tracking reported received the same level of support as those who were relatively lower in Tracking, they did not feel confident they would be able to get support when they needed it.

Various lines of research would help to further test our model of social exchange styles, to develop a deeper understanding of each dimension, and to provide insight into how the constructs can be used practically. We believe that a complete accounting of any behaviour requires an understanding of how it
developed over the course of evolutionary history including its function (i.e., how it helped solve adaptive problems), and a determination of its ontogeny (i.e., how the behaviour develops and matures over the life span). Taking this into account, two particularly important topics are the development of social exchange styles, and the relationship between social exchange styles to social support. In our previous research, we have theorized about the evolutionary development of social exchange styles, but have not yet focused on ontogeny. Exploring the development of Tracking is necessary for understanding how it can be adaptive for people to display varying levels of this dimension. Moreover, knowledge of the developmental history of people who are high in Tracking may contribute to better understanding the motivations that underlie this factor.

Previous research has explored the function of social exchange styles by relating them to amount of support perceived and received. Social support was chosen as an important area because it relates to the main adaptive problem of the reciprocity domain, acquisition of resources. We planned to extend these findings by examining how people’s levels of Tracking relate to how they respond emotionally to receiving or failing to receive support. This will contribute to our knowledge of the function of Tracking, and will provide some insight into how Tracking relates to a person’s current context. Together, a new focus on ontogeny, and a continued focus on adaptive function of Tracking will contribute to informing the social exchange style model, and we hope that it will contribute to a foundation for continuing research about social exchange styles.
Study 1- The Development of Tracking

Within the context of evolutionary psychology, a theory of personality needs to account for the adaptive function of individual differences. In particular, explanations are needed for the presence of variation as opposed to within-species homogeneity. The early work of evolutionary psychologists assumed a universal human nature and focused on species-typical adaptations (Tooby & Cosmides, 1990). More recently, evolutionary psychologists have begun to promote the notion of adaptive individual differences: the idea that some of the variance that we see in human behaviour is the result of variance in the selective pressures in the environment of evolutionary adaptiveness (EEA), or that variance in behavioural expressions can result from universal EPMs that respond differentially to distinct environmental inputs (for reviews see Buss, 2009; Buss & Greiling, 1999; Nettle, 2006; Penke, Denissen, & Miller, 2007).

Of the theories that seek to explain the evolutionary function of individual differences, balancing selection has received the most attention (e.g., Bergmüller, 2010; Maynard Smith, 1982; Penke et al., 2007). This theory suggests that there are different traits that can be favoured by different environments. Balancing selection can occur in at least two ways: frequency-dependent selection (Dall, Houston, McNamara, 2004) and spatio-temporal environmental heterogeneity (Roff, 1997). Frequency-dependent selection, which refers to the selection and preservation of two or more strategies within a population at a particular frequency relative to each other, would suggest that different social exchange styles are maintained within the population as their contribution to fitness depends
upon the presence of alternate styles in the population. However, we find the other form of balancing selection, spatio-temporal environmental heterogeneity, to be a more promising explanatory mechanism for social-exchange styles. This refers to the selection of different strategies within different environments. This process is illustrated in a study of lizards in which researchers found that more sociable lizards were more successful in high-density populations, whereas less sociable lizards were more successful in low-density populations (Cote, Dreiss, & Colbert 2008). Depending on the cost of behavioural flexibility, one strategy can become dominant for the individual’s lifespan, or strategies can be flexibly employed depending on a person’s more immediate environment (Bergmüller, 2010; Buss, 2009).

Theories of early experiential calibration and contingent shifts according to the environment are particularly relevant to the development of personality. Buss & Greiling (1999) defined early experiential calibration as the process by which alternative strategies become preferred by an individual in response to their early environment. According to Buss and Greiling, each person is equipped with an array of potential strategies, and from this species-typical menu, one strategy becomes dominant, according to each individual’s early experiences. Contingent shifts according to the environment are also based on the idea of a species-typical menu of strategies. However, instead of one strategy becoming dominant based on early experiences, strategies are flexibly employed depending on a person’s more immediate surroundings (Buss, 2009). The field’s increasing focus on adaptive individual differences allows us to seriously consider a personality
psychology that is based in evolutionary psychology. Examining the ontogeny of
traits is essential to the development of such a model of personality.

To select variables that could contribute to the development of Tracking
levels, we drew on biological market theory, a theory that has contributed to
understanding exchange behavior in various species. In understanding the
adaptive function of exchange behaviour among non-kin, biological market theory
provides a way to understand the mutual benefits received through helping others.
A primary assumption of the theory is that exchange relationships share important
characteristics with economic markets, including overarching principles of supply
and demand (Noë & Hammerstein, 1994, 1995). For instance, after a dinner party,
receiving help with dishes from a friend has a different value depending on
whether others have also offered to help (variance in supply), and whether the
friend has a dishwasher (variance in demand). Additionally, partner value is
important in determining access to resources. People are more likely to share
resources with others who are valuable partners to them because of status,
attractiveness, or personal characteristics such as loyalty and trustworthiness.
Mutual benefits in exchange relationships are understood as a function of both
supply and demand, as well as a person’s value as a partner. Drawing on this
theory, we were interested in how resource supply, resource control, and the
partner value of self and others would affect the development of Tracking.

Objectives and hypotheses. We sought to understand how recalled
experiences while growing up are associated with adult levels of Tracking. We
presume that it is adaptive for all people to engage in Tracking to some degree,
but we are interested in environments that promote particularly high or low levels of this dimension. Drawing on the theories of adaptive individual differences, we assumed that a person would develop a tendency to engage in high levels of Tracking when s/he is brought up in an environment in which it is useful to monitor costs and benefits frequently and precisely. Before exploring market variables, we conducted a confirmatory factor analysis (CFA) on the Tracking dimension of the SESQ-II. Next, we examined variables drawn from biological market theory, which we believed would be related to the development of Tracking. We focused on resources, environmental cues to others’ trustworthiness, and cues regarding one’s own value as a partner. Because no prior studies have examined this question, hypotheses were theoretically derived.

We were interested in various aspects of resources, specifically amount, ease of access, and control over access. We hypothesized that the amount of resources a person had available to them early in life would play a role in a person’s development of Tracking. We anticipated that one path to the development of high levels of Tracking would be environments in which people had less access to resources than those around them, which we conceptualized as low supply. We theorized that it would be adaptive for a person to make sure they did not receive less than their fair share in exchanges if they were already at a disadvantage relative to their peers.

We also anticipated that the ease with which one could access resources would play a role in a person’s development of Tracking. Specifically, we expected that being able to gain access to resources easily, with little cost to
oneself, would result in high levels of Tracking. We hypothesized this relationship because we expected that relatively easy access to resources would calibrate EPMs to expect a high level of resources from others in one’s environment.

Finally, we were also interested in how a person’s control over access to resources when growing up would predict increased levels of Tracking in adulthood. We conceptualized control as the degree to which a person could influence their access to resources with their own behaviour. In an environment with clear contingencies of how behaviour leads to benefits, a person would not need to keep careful track of these benefits because their behaviour would be enough to ensure they were not exploited. For example, if a person knew that when s/he did the dishes s/he would earn money to spend on hobbies, keeping careful track of finances would not be necessary. On the other hand, environments in which access to benefits was unclear or unstructured would encourage precise monitoring in order to ensure stable gains.

In addition to variables related to resources, we examined variables related to partner value, both in terms of the value people perceived others to have, and in a person’s self-perceived value as a partner. One of the most important qualities in an exchange partner is trustworthiness (Noë & Hammerstein, 1995). In the EEA, high levels of Tracking would have been most useful and necessary when the majority of potential trading partners were not trustworthy, because a person would need to engage in frequent and precise monitoring in order to avoid exploitation. Regarding one’s own value, Tracking would be more useful for
individuals who were low-value exchange partners. High value partners typically receive increased resources from others who seek to secure them as long-term allies (Noë & Hammerstein, 1995), whereas one can imagine that a low-value partner would receive less than their fair share if they did not take measures to ensure otherwise. Based on these lines of reasoning, we expected people to engage in increased Tracking if they recalled an environment in which they received cues that others were typically untrustworthy based on parental overcontrol, and if they had experienced parental rejection, which would communicate to them that they were of low value to others.

Methods

Participants

Participants were 200 college students (97 men; 103 women) who ranged in age from 18 to 25 ($M = 20.34$, $SD = 1.91$) and were fluent in written English. Participants were recruited through online advertisements and an undergraduate psychology department participant pool. Participants who were recruited through advertisements were compensated $15, while participant pool participants received credit towards their course mark. Results from this sample addressing the development of neediness and connectedness have been published elsewhere (Kopala-Sibley, Zuroff, Leybman, & Hope, in press). Sample size varied somewhat by analysis because participants with missing data were omitted.

Procedure

Potential participants emailed a research assistant to express interest in taking part in the study. A research assistant then emailed eligible participants a
link to our survey, which was administered by Survey Monkey, an online questionnaire administration service. Informed consent was obtained online, and participants were instructed to complete the entire battery within 90 minutes.

Measures.

Social Exchange Styles Questionnaire-II (SESQ-II; Leybman et al. 2011b).

The SESQ-II was designed to assess individual differences in social exchange styles. Before completing the questionnaire, participants were asked to write down the initials of three people they considered to be social exchange partners. The term alliance was defined and then used throughout the scale instead of the term social exchange relationship in attempt to circumvent the aversion people might have to conceptualizing their relationships as motivated by exchange. The eight items of the Tracking factor are included in Table 3.1, along with their means and relationship with the latent factor based on this sample. We used an approximate factor score in which we took the mean of the eight items to measure people’s levels of Tracking. All other questionnaires assessed early experiences by asking participants to think about their experiences between the ages of 10 and 14. This time frame was chosen because theory and evidence suggest early adolescence as a key time for development of personality (e.g., Blatt, 2004; Roeser, Eccles, & Sameroff, 2000). Reviews have demonstrated that reports about this period of adolescence are valid and reliable (e.g., Hardt & Rutter, 2004).

Supply of resources. We assessed people’s resources, relative to their peers, by summing two items that were rated on a 5-point Likert scale, ranging from “I had less than others” to “I had more than others”: (1) To what extent did
Table 3.1

$\beta$ related to latent factor in the CFA, means and standard deviation of each Tracking item and each variable in Study 1

<table>
<thead>
<tr>
<th>Item or Variable</th>
<th>$\beta$</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I pay close attention to how much an alliance is costing me.</td>
<td>1.00</td>
<td>2.57</td>
<td>1.08</td>
</tr>
<tr>
<td>I keep track of my investments in an alliance to avoid being taken advantage of.</td>
<td>.99</td>
<td>2.90</td>
<td>1.14</td>
</tr>
<tr>
<td>I focus on monitoring long-term benefits in alliances.</td>
<td>.86</td>
<td>2.87</td>
<td>1.06</td>
</tr>
<tr>
<td>I focus on monitoring long-term costs in alliances.</td>
<td>.99</td>
<td>2.49</td>
<td>1.13</td>
</tr>
<tr>
<td>I keep track of my short-term costs and benefits in an alliance.</td>
<td>.83</td>
<td>2.51</td>
<td>1.15</td>
</tr>
<tr>
<td>Because I am suspicious of allies, I keep track of short-term costs and benefits.</td>
<td>1.12</td>
<td>2.21</td>
<td>1.07</td>
</tr>
<tr>
<td>I pay close attention to how much I am benefiting in an alliance.</td>
<td>.89</td>
<td>2.70</td>
<td>1.18</td>
</tr>
<tr>
<td>I do not keep careful track of how much I benefit in alliances (Reverse-scored)</td>
<td>1.01</td>
<td>2.91</td>
<td>1.15</td>
</tr>
<tr>
<td>Tracking</td>
<td></td>
<td>2.64</td>
<td>.86</td>
</tr>
<tr>
<td>Supply</td>
<td></td>
<td>3.24</td>
<td>.93</td>
</tr>
<tr>
<td>Spoiled</td>
<td></td>
<td>2.15</td>
<td>.96</td>
</tr>
<tr>
<td>Resource Control</td>
<td></td>
<td>2.55</td>
<td>1.27</td>
</tr>
<tr>
<td>Parental Warmth</td>
<td></td>
<td>49.95</td>
<td>15.04</td>
</tr>
<tr>
<td>Parental Control</td>
<td></td>
<td>28.00</td>
<td>13.79</td>
</tr>
</tbody>
</table>
you have just as much access to material goods as other kids at your school (e.g., toys, or clothes)?, and (2) To what extent did you have just as many opportunities as other kids at your school (e.g., access to costly extracurricular activities)? Although this is not a direct measure of supply, we conceptualized it as representing a person’s subjective experience of their resource supply relative to their peers. These items were correlated with each other, $r (189) = .67, p < .001$.

*Easy access to resources.* For measuring ease of access to resources, we asked about the colloquial concept of being “spoiled.” These items were meant to assess a person’s experience of getting access to resources without needing to invest much effort. We summed two items that were rated on a 5-point Likert scale, ranging from “not at all true of my experience” to “extremely true of my experience”: (1) I believed that I could get whatever I wanted from my caregivers, and (2) I was often told by others that I was “spoiled.” These items were moderately correlated with each other, $r (189) = .52, p < .001$.

*Control over resources.* To assess the amount of reliable control people had over access to resources when growing up, we asked participants to indicate on a 5-point Likert scale, ranging from “not at all” to “very much”: To what extent did your caregivers set clear rules about how you could earn privileges at home (e.g., television privileges, staying up late, etc.)?

*Partner value.* We examined parental behaviour as a determinant of how children learn to view themselves and others, using the Parental Bonding Inventory (PBI; Parker, Tupling, & Brown, 1979). The PBI is a widely-used measure of recalled parenting experiences. The questionnaire asks about the
behaviours of both parents using a 4-point Likert scale, ranging from “very unlike” to “very like.” The control subscale is well-validated (e.g., Parker, 1989) and asks about how overprotective parents were while a person was growing up. We assumed that overprotective parents would convey the sentiment that, in general, one should not readily trust that the world is safe, or trust others. Sample items for this scale include, “My mother/father tried to control everything I did,” and “My mother/father was overprotective of me.” In our sample, this scale had a Cronbach alpha of .89 for both mothers and fathers. We summed the two parent scores together for our measure of trustworthiness of others.

We used a similar strategy to measure individuals’ own perceived partner value, basing it on parental behaviours that indicated care (leading children to feel of high value) versus rejection (leading children to feel of low value). For this, we used the Care subscale of the PBI, which assesses parental warmth, nurturing, and affection. This subscale is also well-validated (e.g., Parker, 1989). Sample items include, “My mother/father was affectionate towards me,” and “My mother/father did not talk to me very much” (reverse-scored). In our sample, this scale had a Cronbach alpha of .94 for both mothers and fathers. We summed the two parent scores together for our measure of a person’s early perception of their own partner value, based on parental value feedback.

Results and Discussion

Confirming the Tracking dimension. Means and standard deviations for all measures are presented in Table 3.1. Our first objective was to explore the factorial validity of Tracking using a CFA. This analysis was carried out in
AMOS 5. We assessed the fit for a model in which the eight Tracking items were entered as indicators for a single latent variable. This model had an excellent fit, $\chi^2 / df$ ratio = 1.29, GFI = .97, CFI = .99, and RMSEA = .04. All factor loadings exceeded $\beta = .83$, $p < .001$. This supported the existence of a Tracking dimension that measures the degree to which people monitor their costs and benefits in social exchange relationships and allowed us to continue with further analyses.

**Biological market variables.** We predicted that increased use of Tracking in adulthood would be predicted by the following features in one’s early developmental environment: having less than one’s peers, being spoiled, unstructured control over resource access, parental overprotectiveness, and parental rejection. Correlations of all the variables in this model are presented in Table 3.2. To test these hypotheses, we used a multiple regression analysis in which all predictors were entered simultaneously. Sex was initially included as a covariate, but was not significant and so was removed from the model. The overall model predicting Tracking was significant, $R^2 = .15$, $p < .001$. Specifically, Tracking was significantly predicted by recalled experiences of having less than one’s peers ($\beta = .14$, $p < .05$), recalled experiences of being spoiled ($\beta = .18$, $p < .01$), low control over resources ($\beta = .11$, $p < .05$), and parental overprotectiveness ($\beta = .20$, $p < .01$). Notably, these effects were independent of each other. Additionally, we examined interaction between each of the variables that were significant in our model and none of these interactions was significant.
Table 3.2

Correlations between all variables in Study 1

<table>
<thead>
<tr>
<th></th>
<th>Tracking</th>
<th>Supply</th>
<th>Spoiled</th>
<th>Control Over Resources</th>
<th>Parental Warmth</th>
<th>Parental Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracking</td>
<td>1.00</td>
<td>-0.09</td>
<td>0.20**</td>
<td>-0.19**</td>
<td>-0.09</td>
<td>0.25**</td>
</tr>
<tr>
<td>Supply</td>
<td>1.00</td>
<td></td>
<td>0.30***</td>
<td>0.05</td>
<td>0.25**</td>
<td>-0.13</td>
</tr>
<tr>
<td>Spoiled</td>
<td>1.00</td>
<td></td>
<td></td>
<td>0.11</td>
<td>0.09</td>
<td>0.06</td>
</tr>
<tr>
<td>Control Over Resources</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td>0.09</td>
<td>-0.06</td>
</tr>
<tr>
<td>Parental Warmth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.47***</td>
</tr>
<tr>
<td>Parental Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
</tbody>
</table>
This model confirmed all of our hypotheses, with the exception that we did not find that parental rejection, which presumably led individuals to believe they were low-value partners while growing up, predicted the development of high levels of Tracking. It could be that instead of resulting in a person Tracking more than most people do, believing oneself to be a low-value partner could lead a person to feel that they were not worthy of access to resources, and might encourage a person to make themselves appear more valuable as a partner instead of using more Tracking.

Another possible explanation for the absence of a relation between Tracking and parental rejection is that believing oneself to be a low-value partner only leads to high Tracking in particular circumstances. Specifically, one can imagine low parental care leading to different strategies depending on which other resources a person could access at home or at school. For example, if a person receives indications that they are not valuable and also has a low supply of resources it might encourage the up-regulation of responses serving to increase one’s partner value. On the other hand, if a person receives indications that they are not valuable but has a larger supply of resources, it might encourage increased tendencies to diligently monitor that supply. To test for such possibilities, we conducted an exploratory analysis of interactions between parental care and our other predictor variables to examine potential moderators that could predict the development of Tracking in an environment of parental rejection. Interactions between parental care with parental overprotectiveness, being spoiled, unstructured control over resources, and recalled experiences of having less than
one’s peers were entered simultaneously into the model while adjusting for the main effects of each predictor. Significant two-way interactions were interpreted by calculating simple slopes and point estimates as suggested by Aiken and West (1991). Interactions were interpreted by comparing simple slopes at high and low levels (+/- one standard deviation) of the moderator variable.

We found a significant interaction between indications from parents that a person was low value and being spoiled, which predicted the development of Tracking, $\beta = .17, p < .05$ (see Figure 3.1). Simple slope analyses showed that when a person grew up in the context of parental warmth and presumably learned to believe they were high-value partners, being spoiled had no significant effect on their development of Tracking ($\beta = .03, p = \text{n.s}$). On the other hand, when a person did not receive warmth and affection from their parents while growing up, being spoiled predicted increased levels of Tracking later in life $\beta = .37, p < .001$. A contrast comparison confirmed that these slopes are significantly different $t(181) = -2.74, p < .01$. This finding suggests that people turn to monitoring tangible resources when this is the main type of resource that is in high supply in their family of origin.
The findings presented above provide a base for understanding the development of high levels of Tracking. Regarding supply of resources, the development of increased Tracking seems to be related to growing up in an environment in which one has a lower supply of resources than their peers, easy access to resources because of being spoiled at home, and the belief that their behaviour does not tend to predict whether or not they will be able to access a supply of resources. Regarding partner value, the development of increased Tracking seems to be related to environments in which parents are overprotective, which we suggest leads children to learn that others are not trustworthy. Our results did not support the hypothesis that parental rejection would result in high Tracking. However, we did find a significant interaction between parental care

Note. High and low values represent one standard deviation higher and lower than the mean.
and being spoiled, which showed that people who did not receive warmth and affection from their parents and who were also spoiled were likely to develop a strategy that included high levels of Tracking.

Results from this study show that variance in the developmental environment promotes variance in social exchange styles. In general, these results are consistent with the idea of adaptive individual differences. We interpret our findings as a suggestion that Tracking behaviour is driven by an EPM or a set of EPMs that are part of the species-typical menu, which can become preferred to different degrees based on the environment in which a person grows up. Given that Tracking is correlated with a degree of distress (such as perceiving less support than one has available; Leybman et al., 2011b), as well as to increased neuroticism (Leybman et al., 2011b), paranoid traits (Leybman & Zuroff, 2009), and borderline traits (Leybman & Zuroff, 2009), understanding how Tracking is adaptive in the environment in which it develops is essential to understanding why it is a part of the repertoire of human behaviour. Importantly, adaptiveness does not necessarily relate to a person’s being happy or content in their environment. Presumably, given exposure to the types of environment that we have described, people who developed high Tracking would have been more likely to survive or to leave more offspring in the EEA than those who do not, even if they may have been less happy then or are less happy in the present day environment.

Our results provide insight into the motivations that underlie high levels of Tracking in social-exchange relationships. Our results suggest that Tracking
might be related to anxiety about not having enough resources, a state to which EPMs could be sensitive as a result of having less than one’s peers while growing up. Engaging in heightened Tracking might also be motivated by a mistrust of other people, resulting from parental overprotectiveness. This is consistent with previous literature, which suggests that people who are high on our Tracking dimension also tend to rate others as untrustworthy (Leybman et al., 2011b).

Finally, Tracking was related to an interaction between a lack of parental warmth and affection and being spoiled with tangible resources. Specifically, Tracking was predicted by low parental warmth, but only when a person was also spoiled. Thus, Tracking could also be instigated by having EPMs tuned to respond to material resources because they are in higher supply than relational benefits. We speculate that for people in these types of environments, material resources begin to represent other people’s affection. If a person does not receive affection from their parents, he or she might respond by becoming more attuned to other indications that a person is cared for, which would motivate increased Tracking behaviours and cognitions.

Cosmides, Barrett, and Tooby (2010) have argued that the EPMs that regulate cheater detection are only activated when a person is faced with someone violating general trading rules, for example by being exploitative. Additionally, they propose that trading violations become particularly important when those violations are likely to provide a person with information about the character of a trading partner or potential trading partner. Although we believe that the degree to which these responses will occur differ from person to person, this idea could give
insight into why people become more likely to track when they are brought up in environments such as those we have described. It could be that people in these environments face situations that stimulate increased use of cheater detection mechanisms so often that their EPMs become increasingly sensitive and are activated even when no rules are being broken.

We interpret our results as consistent with an evolutionary interpretation of development, but we acknowledge that the data are also consistent with more traditional social learning interpretations. It is possible, for example, that Tracking receives more reinforcement in environments in which resources are scarce and is learned through operant conditioning (Skinner, 1938). Perhaps Tracking behaviours are negatively reinforced because they reduce the likelihood that one will be unpleasantly surprised by the scarcity of resources. Or, perhaps Tracking is positively reinforced with praise by overprotective parents because they view Tracking behaviours as a way for their children to protect themselves from being exploited. It might also be that Tracking behaviour is modeled by overprotective parents and thus learned through the mechanisms of social learning (Bandura, 1977). Although our results are consistent with an evolutionary perspective, they do not rule out alternative explanations.

Some limitations of this study should be noted. First and foremost, findings are based on retrospective self-report questionnaires, and many of the variables are based on a small number of items. Second, we created some of the measures for this study, and they have not been validated. Related to this, several of our measures were indirect measures of the underlying construct. Finally, we
tested a population that had a higher socioeconomic status than average, which might have prevented us from gaining insight into the experience of having a truly low supply of resources. Despite these limitations, we are encouraged by our results. We hope that future research will continue this research using longitudinal studies and well-validated measures, while addressing other limitations from our study.

Study 2 - Tracking and Social Support

After exploring environments that fostered differing levels of Tracking in exchange relationships, we were interested in how Tracking affected a person in their current environment. We decided to explore social support because it relates to resource acquisition, tying the variable to its adaptive function. Previous research has demonstrated that Tracking is related to low perceived social support; that is, people who tend to monitor their costs and benefits in exchange relationships hold a belief that they will not have access to social support when they are in need (Leybman et al., 2011b). In contrast with its relationship with perceived support, there is no significant relationship between Tracking and reported received support (Leybman et al., 2011b). In this study, we were interested in exploring emotional responses to receiving social support in individuals high or low in Tracking.

Evolutionary psychologists postulate that EPMs exist in order to solve the adaptive problems that are faced in the environments that promoted their development (Buss, 2004). According to Buss (2004), EPMs receive input from the environment and then use a series of decision rules to generate outputs, which
can take the form of behaviours, cognitions, physiological responses, or emotions. This output can help to solve adaptive problems by motivating behaviour. For example, EPMs related to the social-exchange domain would presumably generate emotional responses to motivate people to continue engaging in beneficial alliances, and to terminate unreliable allies or to seek corrective behaviour. An important part of understanding the Tracking dimension within the social-exchange domain is to understand how people who are high or low in Tracking respond emotionally to inputs into the EPMs that regulate exchange behaviour. Thus, we sought to explore emotional reactions to received support, or a lack thereof, for people who engage in varying levels of Tracking.

Objective and hypotheses. As in Study 1, we first sought to confirm the factorial validity of Tracking within this sample. Next, we sought to explore people’s emotional reactions to receiving social support. In order to test specificity, for each hypothesis we also identified emotional responses that would be less relevant to the exchange situation. Because people high in Tracking typically felt deprived relative to peers when growing up, we hypothesized that they would feel positive affect (PA) on days when they received support, and that they would thus experience less PA on days when they received less support. We hypothesized that this positive response would specifically be a high activation PA, as opposed to a lower activation PA of being soothed or relaxed. Additionally, because people high in Tracking appear to expect and want others to share resources with them, we anticipated that on days when people high in Tracking were granted particularly low access to resources (low received
support), they would feel angry, the feeling associated with unfairness and with having one’s goals blocked. We hypothesized that the effect would be specific to the response of anger, and that no analogous effects would be found for feeling fearful or guilty. We hypothesized that there would not be a significant relationship between received support and mood for people low in Tracking.

We used a daily diary research method to reduce the risk of retrospective bias, which increases as a function of the length of time between an event and the time of assessment. Diary studies allow for the study of individuals’ everyday social and psychological processes. Bolger, Davis and Rafaeli (2003) posit that diary methods are ideal for obtaining reliable person-level information and for obtaining estimates of within-person change over time, as well as individual differences in such change.

Methods

Participants and Procedure

One hundred undergraduate students from McGill University who were fluent in written English were recruited through classified advertisements on McGill’s website and Facebook (50 men; 50 women). Participants’ ages ranged from 18-25 (\(M = 20.30, SD = 1.74\)). The study involved an initial lab session and a 7-day daily diary component. At the lab session, participants completed the SESQ-II on Survey Monkey, an online questionnaire administration program. The item with the lowest loading from previous studies, “I do not keep careful track of how much I benefit in alliances” (reverse-scored) was omitted from the scale in this study for brevity. Results addressing main effects in the relationships between
social exchange styles and perceived and received support based on this sample have been published elsewhere (Leybman et al., 2011b).

For seven days beginning the day after the lab session, a research assistant emailed participants a link at 6pm to complete a mood scale and a social support questionnaire on Survey Monkey. Participants were asked to complete the questionnaire between 6pm and 6am each day, and diary entries that were returned outside of this time range were treated as missing. Participants were told that they could miss a maximum of one diary entry and make it up on the eighth day. Participants were compensated $16 for the initial baseline session, $2 for each completed online diary entry and a $20 bonus for completing seven diary entries within eight days.

*Positive and negative affect scale* (PANAS; Watson, Clarke, & Tellegen, 1988). The PANAS is a widely-used measure of mood states. This scale consists of two 10-item scales assessing positive affect (PA) and negative affect (NA). Watson and Clark (1994) also divided PA and NA into lower order subscales, consisting of: Joviality, Self Assurance, and Attentiveness for PA; and Fear, Hostility, Guilt, and Sadness for NA. Additionally, there are subscales to assess other emotions such as Serenity. Each subscale consists of a series of affect adjectives that participants were asked to rate on a 5-point Likert scale. We analyzed the Joviality subscale of PA (sample items include happy and joyful), Serenity (sample items include calm and relaxed), the Hostility subscale of NA (sample items include hostile and angry), the Fear subscale of NA (sample items include afraid and nervous) and the Guilt subscale of NA (sample items include
guilty and ashamed). We used three items to assess each of these subscales, except for Guilt, for which we used two items. To construct these subscales, we used trimmed versions of the subscales defined by Watson and Clarke (1994). In our study, the Cronbach alphas for Joviality, Serenity, Hostility, Fear and Guilt, based on the first daily diary, were .85, .78, .75, .81 and .81 respectively.

*Social Provisions Scale (SPS; Cutrona & Russell, 1987).* The SPS assesses both perceived and received social support. Perceived support questions ask about whether a person believes they could get support if they needed it, whereas received support questions ask about whether a person actually received particular types of support that day. The SPS asks about six provisions of support, but the current study administered an amended 3-item version of the SPS focused on perceived and received guidance (“To what extent did another person(s) provide you with advice or guidance today?”), reliable alliance (“To what extent did another person(s) come to your assistance today?”), and emotional closeness (“To what extent did another person(s) provide you with a sense of emotional security and well-being today?”). These provisions are frequently grouped to form a measure of social support (e.g., Cutrona, 1989), and this grouping is frequently used as a measure of social support in diary studies (e.g., Dunkley, Zuroff, & Blankstein, 2003; Dunkley, Blankstein, Halsall, Williams & Winkworth, 2000). Items were rated on a 7-point Likert scale. In this study, the Cronbach alphas for perceived and received social support (based on the first daily diary) were .70, and .74, respectively.
Results and Discussion

**Confirming the Tracking dimension.** Our first objective was to test the factorial validity of the Tracking dimension in this sample using a CFA. We assessed the fit of the same model that was tested in Study 1, but with the seven items instead of eight. This model had a good fit, with three of the fit indices demonstrating excellent fit ($\chi^2 / df$ ratio = 2.04, GFI = .93, CFI = .95), and one index demonstrating adequate fit (RMSEA = .10). All factor loadings exceeded, $\beta = .95$, $p < .001$. This supported the existence of a Tracking dimension in this sample, and allowing us to continue with further analyses.

**Emotional reactions to social support.** We hypothesized that people would respond to receiving support with PA, and specifically Joviality rather than Serenity. We also hypothesized that on days when people received less support than usual, they would respond with the specific negative affect of Hostility, rather than Fear or Guilt. To test these hypotheses, we used the PROC MIXED procedure and maximum likelihood estimation in SAS 9.2. We computed between-person scores (mean daily support scores across the week) and centered within-person scores (daily support minus mean support). Thus, within-person scores represented day-to-day fluctuations in perceived and received social support. Multilevel models included a random intercept and a first-order autoregressive error structure. The Kenward-Rogers option was used to determine degrees of freedom.

To determine whether people who are high in Tracking experience Joviality when they receive more social support than usual, we simultaneously
entered main effects for Tracking, between-person received support, within-person received support, and interactions between Tracking and both levels of support. The autoregressive correlation was $r = .31, p < .001$. Results for Joviality revealed a significant interaction between daily fluctuations in received support and Tracking, $\beta = .06, t (605) = 2.67, p < .01$. Interactions were interpreted by comparing simple slopes at high and low levels (+/- one standard deviation) of the moderator variable. For this analysis, the simple slope of received support at low Tracking was $0.007, p > .50$, and the simple slope of received support at high Tracking was $0.12, p < .001$. A contrast comparison confirmed that these slopes are significantly different $t (605) = 2.68, p < .01$. The direction of the interaction indicated that people who are low on the Tracking dimension have stable levels of Joviality, regardless of the support they receive on any given day. On the other hand, people who are high in Tracking experience a steep increase in Joviality on days when they receive particularly high levels of support. A graph of this interaction is provided in Figure 3.2. We conducted the same analysis testing the effect of receiving support interacting with Tracking to predict Serenity, and this interaction was not significant, $p > .50$, confirming that this finding is specific to high activation PA.
Note. High and low values represent one standard deviation higher and lower than the mean.

To determine whether people who are high in Tracking experience Hostility when they receive less social support than usual, we tested a model in which we simultaneously entered main effects for Tracking, between-person received support, within-person received support, and interactions between Tracking and both levels of support. The autoregressive correlation was .21, $p < .001$. Results for Hostility revealed a significant interaction between daily fluctuations in received support and Tracking, $\beta = -.05$, $t (627) = -2.43$, $p < .05$. For this analysis, the simple slope of received support at low Tracking was .04, $p > .05$, and the simple slope of received support at high Tracking was -0.05, $p = .05$. A contrast comparison confirmed that the simple slopes differed significantly, $t (627) = -2.43$, $p < .05$. The plot of the interaction indicated that while people
high in Tracking are generally more hostile than people low in Tracking, their Hostility increases even more on days when they receive particularly low levels of support (see Figure 3.3). We conducted the same analysis testing receiving support interacting with Tracking to predict Fear and Guilt, and neither of those interactions was significant, \( p > .30 \) for Fear and \( p > .50 \) for Guilt, indicating that this reaction is specific to Hostility, rather than being a general negative affective reaction.

*Figure 3.3*

Received support interacting with Tracking predicting Hostility

![Graph showing the interaction between received support and tracking on Hostility.](image)

*Note.* High and low values represent one standard deviation higher and lower than the mean.

We examined time-lagged analyses for each of our effects by entering prior days’ levels of support as predictors. None of these effects was significant, indicating that people are responding to the support interactions of each day, rather than experiencing emotional effects that carry over from the prior day.
Our results showed that people who exhibit high levels of Tracking are sensitive to receiving or not receiving support, in that they experience steep increases in Joviality when they receive more support than usual, and increases in Hostility when they receive less social support than usual. Taken together with the results of Study 1, these results provide insight into the adaptiveness of engaging in high levels of Tracking in social-exchange situations.

From an evolutionary perspective, emotions can activate or deactivate behaviour in response to triggers in a person’s environment (Buss, 2004; Cosmides & Tooby, 2000). Given that the social exchange domain evolved as a system to promote acquisition of resources, EPMs that regulate exchange behaviour should encourage people to maintain alliances that will result in resources, and to terminate, be suspicious of, or punish alliances that will not result in increased resources. If we consider that people develop higher levels of Tracking in environments in which they learn that others are generally not trustworthy, then one can imagine these people being particularly sensitive to receiving low levels of support. Low Joviality and high Hostility could serve as signals that a person’s trading partner is not trustworthy or is not ideal in some other way. These emotions could serve as motivating efforts to seek, avoid, or punish particular allies. Although Tracking is related to some increased distress-related characteristics such as low perceived support, increased Hostility, and Neuroticism, it also appears to be related to emotional reactions that may increase the chances that people surround themselves with others who will treat them fairly in exchange situations.
The findings from this study have implications in various areas. We are especially interested in how these results might eventually be applied to organizational settings, where exchange dynamics are particularly relevant. One can imagine that a person’s social exchange style is an important part of how they perform, and how they get along with other members of their team. In particular, our results also suggest that social exchange styles will affect people’s emotional reactions to various elements of group dynamics, which could affect their behaviour on a team and long-term productivity. Related to this, group compositions of exchange styles could affect short- and long-term productivity, which would be an interesting avenue for future research.

The generalizability of our results is limited by our use of a college student sample. Moreover, our primary measures were self-report scales administered at the end of each day rather than immediately after specific interactions. It would be useful to use event-contingent recoding methods to learn about emotional reactions to supportive or non-supportive interactions immediately after they occurred. Future studies could examine reactions to specific interactions in which someone receives support, reactions to receiving support from different people, and receiving different kinds of support (e.g., controlling versus nurturing).

General Discussion

Our two studies supported the validity of Leybman and colleagues’ (2011b) revised measure of Tracking and illustrate the utility of examining individual variation in evolutionary personality variables such as social exchange
In Study 1, we found that Tracking was predicted by recalled experiences of having less access to resources than one’s peers, having low control over resources and parental overprotectiveness. We also found a significant interaction in which people who were well cared for and learned to believe they were high-value partners did not engage in increased Tracking if they were spoiled. On the other hand, when a person did not receive warmth and affection from their parents while growing up, being spoiled predicted increased levels of Tracking as adults.

In Study 2 we found that Tracking predicted experiencing boosts in activated PA (Joviality) on days when people felt they had received more social support than usual. Additionally, results showed that people high in Tracking became more hostile on days when they received less support than usual. We interpret these results as an indication of how important social support is for people high in Tracking in terms of providing information about a person’s general access to resources in their current environment. When these people are supported, EPMs interpret this input as a confirmation that a person has access to resources, and therefore support results in a boost of activated PA. Conversely, when they do not receive support, it triggers emotions related to being deprived of the resources they have learned they are entitled to receive, therefore resulting in Hostility. These emotions can be understood as outputs in and of themselves, or they can be understood as providing new inputs to EPMs, which serve to motivate behaviours.

The results of our studies are consistent with an evolutionary interpretation
of Tracking as a dimension of social exchange style. Buss and Greiling (1999) suggest that people have a species-typical menu of behaviours that they might adopt to various degrees based on which EPMs are activated early in life. The environment influences calibration, drawing out differing degrees of behaviours depending on the resources and care available. As previously discussed, this is notably different from social learning theory, in which environments provide reinforcements and behaviours become preferred based on the extent to which they are reinforced. We suggest that Tracking fits the environmental calibration model, although our data do not rule out alternative interpretations. We propose that everyone has the capacity to Track to a high degree, but a person’s environment helps to determine how much that person will tend to Track on a trait level. It appears that someone will engage in higher levels of Tracking when that person receives signals from their environment that they are not a valuable trading partner, and when they learn that their behaviour cannot reliably predict which resources they can access. That a person would develop a higher tendency to engage in Tracking in this type of environment makes sense, but it does not appear to result in increased access to resources once a person leaves their early environment. Future research should continue to examine the relationship between access to resources and varying levels of Tracking both in the early environment, and later in life.

Another potentially fruitful line of research would involve examining people’s responses to interacting with those who are high or low in Tracking. Although we did not find that Tracking leads to less received support, it would be
interesting to examine whether there are other social consequences that stem from extreme levels of Tracking on either side of the dimension. Additionally, given that our results highlight a somewhat negative side of Tracking in terms of lower perceived support, it would be interesting to explore adult environments in which high levels of Tracking lead to increased support, increased access to resources, or other relational benefits.

Economic games and paradigms could be useful in further understanding behavioural correlates of our constructs. Economic games typically involve distributing sums of money (or other resources) to members of dyads or groups of people. Experimenters have the option to introduce contextual variance in several ways, for instance by changing the number of exchanges in an interaction, changing the relationship between traders, or manipulating the belief participants have about whether they will see their exchange partner again. These sorts of games could be powerful tools with which to explore the behavioural correlates of social exchange styles. Additionally, economic games could lend insight into market variables that influence Tracking, and other dimensions of social exchange styles. For instance, people high in Tracking might become less vigilant when interacting with someone who is higher rank than them.

Finally, we have focused on Tracking in this article, but our social exchange style model also encompasses four other dimensions. We believe that exploring the developmental antecedents of Fairness, Individualism, Benefit-Seeking, and Overinvestment is an important line of research to follow, as is exploring affective reactions to social support in terms of these dimensions.
Continuing the research that we have started in this article using the other dimensions of social exchange styles is important to fully developing the model, and we hope that it will eventually provide insights into how this model can best be used practically.

Although more research is needed to document the origins and implications of social exchange styles, the present results demonstrate the potential for an evolutionarily grounded personality psychology that provides a theory of both content and process. Examining early environments related to Tracking serves to bolster the evolutionary understanding of why individual differences exist in this trait, and examining the relationship between Tracking and social support contributes to better understanding how Tracking affects a person in their current social world. Continuing the line of research that is presented in this article will provide insight into adaptive individual differences and will be an important stepping stone in developing a personality theory that is grounded in evolutionary psychology.
GENERAL DISCUSSION

The purpose of this dissertation was to work towards developing a unified theory of personality based in an evolutionary psychology framework. More specifically, this dissertation was part of a project in which individual differences in Bugental’s (2000) core domains of social living are identified, assessed, and explored. This dissertation presented two articles focused on the reciprocity domain. To begin this discussion, the results of these articles will be summarized. Next, there will be a consideration of the contributions made by this research and a discussion of future research that will help to build on this project.

Summary

Article 1 focused on the development of a new model of social exchange styles. Previous research proposed a two-factor model of this variable (Leybman et al., 2011a), which measured individual differences in *Equitable Alliance Building*, and *Vigilant Alliance Management*. Because I see behaviour in the reciprocity domain as too complex to be captured by two factors, and because many personality measures offer both higher- and lower-order factors to understand the scales, I developed a more comprehensive model of social exchange styles and designed the revised Social Exchange Styles Questionnaire (SESEQ-II) to assess individual differences in social exchange styles based on this new model. Results suggested five dimensions of social exchange: Tracking (frequent and precise monitoring of costs and benefits); Fairness (favouring equity); Individualism (preference for self-reliance and low investment); Benefit-Seeking (desire and promotion of benefiting as much as possible); and
Overinvestment (investing without requirement or expectation of equal investment from others). The original two factors identified by Leybman et al. (2011a) emerged as higher order factors. The dimensions were relatively independent of each other, and demonstrated good retest reliability and construct validity.

Article 1 also explored the relationship between social exchange styles and social support. Social support was chosen as an important area because it relates to the main adaptive problem of the reciprocity domain, acquisition of resources. As is common in the social support literature (e.g., Wethington & Kessler, 1986), we distinguished between perceived support (the amount of support that a person believes is available to them if they need it), and received support (the amount of supportive acts a person reports receiving within a given period of time). Based on aggregated scores across one week’s daily diary entries, it was shown that Tracking and Overinvestment both predicted low perceived support, whereas Fairness predicted high perceived support. Additionally, Individualism predicted low self-reported received support. The five-factor social exchange style model predicted approximately double the variance for both perceived and received support compared with the original two-factor model. Finally, the new model predicted perceived social support over and above the five-factor traits measured by the NEO-FFI. The findings from this article illustrate the utility of developing a comprehensive model of social exchange styles.

Article 2 explored the developmental antecedents and affective consequences of one dimension of social exchange styles: Tracking. The purpose
of this article was to expand on the social exchange model by focusing on its ontogeny and on how it affects a person in their current environment. To address ontogeny, I used an evolutionary framework to consider elements of an early rearing environment that could affect the development of adult levels of Tracking. Results showed that Tracking was predicted by recalled experiences of having less access to resources than one’s peers, having low control over resources, and parental overprotectiveness, which we interpreted as communicating to the child that others are typically not trustworthy. It was also found that people were more likely to develop high levels of Tracking if they recalled experiences of low parental warmth, which we interpreted as cues that a person was a low value partner. However, this finding was only significant for people who also recalled being spoiled. These findings provide insight into motivations that underlie frequent and precise monitoring of costs and benefits in exchange relationships and help us understand the adaptive function of high levels of Tracking.

Article 2 also explored people’s affective responses to social support in the 7-day daily diary study that was presented in Study 2 of Article 1. We found that people experienced boosts in Joviality on days when they experienced particularly high levels of received support. This was in contrast with the absence of boosts in another positive emotion: Serenity. We also found that people experienced high Hostility on days when they experienced less received support than usual, in contrast with the absence of boosts in Fear or Guilt. These results provide insights into how Tracking influences a person in their current context.
Contributions and Avenues for Future Research

The overarching goal of the program of research presented in this dissertation was to contribute to the development of a unified theory of personality based in evolutionary psychology. A major contribution of this project thus far lies in its structured approach to developing scales to assess individual differences in theoretically relevant social domains. This strategy is conducive to providing a comprehensive understanding of human nature because it takes into account the most important areas in which people might differ from each other, rather than collecting a series of variables and striving to group them together on a purely empirical basis. Because of its grounding in evolutionary psychology, this type of personality theory lends itself to being applied widely in fields that are seeking more integrative models of understanding and predicting behaviour.

This dissertation outlines some important steps towards our broad goal, but we see this as a long-term project that will require much more research to complete. This discussion will focus both on using the personality framework we have described as a whole and on the social exchange styles model in particular. We will discuss areas for future research in terms of the content and process of evolutionary theories of personality and the social exchange style model, and in terms of practical uses for an evolutionary understanding of personality, focusing on clinical psychology.

In line with Rotter and Hochreich (1975), I believe that a unified theory of personality needs to encompass both a comprehensive content component and a
comprehensive process component. In terms of content, potential individual difference variables have been outlined in the core social domains of attachment (Griffin & Bartholomew, 1994), social rank (Zuroff et al., 2010), coalitions (Kankesan, Fournier, & Zuroff, 2005), mating (Simpson & Gangestad, 1991), and reciprocity (Leybman et al., 2011b). Describing people in terms of these dimensions could provide a rich understanding of ways that a person will behave in most areas of social living in a way that is left out by other theories of personality. One can imagine a future of personality research in which people are described as securely attached with high tendencies to track and overinvest in exchange relationships and to ruthlessly try to get ahead when pursuing social rank, in contrast with a person who is high in anxious attachment while also preferring Fairness and Benefit-Seeking in exchange relationships and who builds coalitions with others in social rank situations. This would provide more information about a person and how they interact with their social environment than describing personality based solely on the traditional five-factor model of personality. A person’s Agreeableness or Extraversion, for example, could differ based on whether that person is interacting with a boss, a business colleague, or an attractive potential mate. Additionally, even within a domain, specific traits can take on different forms. For example, within the social exchange domain, Agreeableness could manifest as a tendency to form many alliances, a tendency to be generous in alliances, a tendency to be generous towards those who earn it, or any number of combinations. The domain-based approach of individual differences presented here accounts for these types of differences.
In order to build on the content components of these models, research will need to pursue finalizing the dimensions of each domain. Additionally, using measurement strategies other than self-report questionnaires such as other-rated questionnaires, semi-structured interviews, or behavioural observations could bolster the content components of these models. Finally, further addressing construct validity would contribute to the content component of these models. For example, determining the relationship between each factor and behaviour in prisoner’s dilemma games or other economic games, or determining people’s behaviour in specific social support interactions based on social-exchange styles would provide further insight into what is represented by each social-exchange dimension.

In terms of process, a complete accounting of behaviour requires determination of distal processes (i.e., how did the behaviour evolve over the course of evolutionary history?), ontogeny (i.e., how does the behaviour develop and mature over the lifespan?), and proximal processes (i.e., what contextual or situational mechanisms influence the behaviour?). We have theorized about the distal processes related to evolutionary history. We propose that the next important steps will address ontogeny and proximal processes.

Regarding ontogeny, we have focused on retrospective self-report accounts related to Tracking. Several lines of research could contribute to a deeper and broader understanding of how Tracking develops and matures across the lifespan. First, examinations similar to ours related to the other social exchange dimensions will begin to give insights into potentially important factors
for this development. Once potentially important variables have been identified, longitudinal studies will help to determine the stability of these factors across the lifespan and will contribute to understanding how major events can influence a person’s tendency to engage in behaviours related to Tracking, Fairness, Individualism, Benefit-Seeking, and Overinvestment.

Regarding proximal processes, we are interested in other personality traits, as well contextual influences that are situational (i.e., related to environmental factors) and relational (i.e., related to relationship dynamics) that might draw out, or blunt the expression of various behaviours related to social exchange. In terms of other personality traits, future research could explore other individual differences variables that moderate the relationships between social exchange styles and outcomes. One possibility would be to explore interactions between social exchange styles and individual differences in other evolutionarily relevant domains such as attachment or social rank. For example, dispositional Tracking may be expressed differently by individuals whose approaches to social rank are characterized by Dominant Leadership compared to those with high levels of Ruthless Self-Advancement. Two other potential moderators are Crocker and Canevello’s (2008) constructs of self-image and compassion goals. Self-image goals reflect the extent to which people aim to project a particular image of themselves within their friendships, whereas compassion goals reflect the extent to which people aim to help and care for others (Crocker & Canevello, 2008). A person high in Overinvestment who also has image-focused goals might engage in a qualitatively different pattern of social exchange from a person who is high in
Overinvestment and has mostly compassion-focused goals. For example, Overinvestment interacting with high self-image goals and low compassion goals might lead to excessive reassurance-seeking regarding whether or not a person’s efforts are noticed, and a person might experience increased distress if their investments do not result in strong alliances. Conversely, the same social exchange dimension interacting with high compassion goals and low self-image goals would presumably be negatively related to reassurance-seeking behaviour and could result in increased positive affect because people with this personality profile might intrinsically enjoy investing in relationships.

Situational and relational contextual influences will likely differ based on which social exchange dimension is being examined. Future research could draw on biological market theory (Noë & Hammerstein, 1994; 1995) to determine situations that could play important roles in influencing the expression of specific social exchange styles. For example, a person might engage in different degrees of Tracking based on whether they are in a context with many versus few resources, or might engage in different degrees of Overinvestment based on how many partner alternatives they have available to them in a particular environment.

In terms of relational predictors, one theory to draw on might be Clark and Mills’ (1979) theory of social exchange. This theory suggests that people have different expectations and use different rules based on whether they are interacting with someone with whom they have an exchange or a communal relationship. The extent to which a relationship is characterized as communal or exchange could also be a strong influence in terms of increasing or decreasing
behaviours related to our dimensions. For example, perhaps even someone who is high in Tracking, Benefit-Seeking, and Individualism would show decreased levels of each of these dimensions in a strongly communal relationship. In line with the proposition that people can exhibit a dispositional communal or exchange orientation (Clark, Oullette, Powell, & Milberg, 1987), I anticipate that people’s social exchange styles would likely contribute to people’s behaviour in both communal or exchange relationships. Specifically, I predict that behaviour would be best explained through person by situation interactions. For example, for those high in Individualism it might not make a difference whether a relationship is communal or exchange, but for those low in Individualism it might make a big difference. Or, perhaps strongly communal relationships diminish differences between individuals who are high and low in Tracking, whereas exchange relationships magnify them. Based on this line of reasoning, manipulating the relationship would contribute to engaging in specific behaviours. Presumably, many relational variables would have some impact on social exchange styles. A betrayal from an attachment figure could lead to higher Tracking or Fairness; an especially thoughtful gift from a friend might decrease Benefit-Seeking or Individualism; or criticism from a colleague might contribute to increased Overinvestment behaviours. Understanding the contextual influences of behaviour related to social exchange will not only contribute to further knowledge of the traits themselves, but will also allow for experimental research in which people’s social exchange styles can be primed or manipulated.
Another broad contextual variable that could play a role in the expression of social exchange behaviours is culture. It is interesting to consider both whether culture would alter the distribution of social exchange styles, and whether different exchange styles result in varying payoff matrices across cultures. Based on the literature differentiating collective and individualistic cultures (Triandis & Gelfand, 1998), one might imagine that Overinvestment could be relatively high in collectivist cultures, whereas Individualism could be relatively high in Individualist cultures. Additionally, research within the equity theory literature comparing participants from the United States and the Netherlands showed that North Americans were more dispositionally exchange oriented than Dutch participants (VanYperen & Buunk, 1991), indicating that perhaps North Americans could be high in Tracking relative to other cultures. VanYperen and Buunk (1991) also related relationship satisfaction to the extent to which an individual was benefiting within their intimate relationship and showed that American participants were most satisfied in equitable relationships, whereas Dutch participants reported the highest relationship satisfaction when they felt they were overbenefiting compared to their partners. This suggests that people may not only have their own varying dispositions in different cultures, but that people from different cultures may respond differently to how others treat them in terms of social exchange dimensions. Future research is needed to elucidate the relationship between culture and social exchange styles, which in turn could provide further insight into the extent to which social exchange styles are influenced by early experiential calibration, or frequency dependent selection.
Identifying contextual influences on the dimensions of social exchange could help demonstrate how these dimensions fit within an adaptive individual differences framework, and could thus contribute to supporting the underlying evolutionary psychology framework of this personality theory.

Clinical Implications

In developing and fine-tuning evolutionary models of personality, we hope that these constructs will eventually become useful in a variety of areas, for example in work organizations or in schools. Here, the focus will be on potential utility in the area of clinical psychology both in terms of diagnosis and treatment. The field of clinical psychology tends to be explained through micro-theories, which focus on explaining a particular set of symptoms from a particular point of view. For example, agoraphobia can be understood as a failure to interpret a fear response properly, resulting in avoidance of situations that result in physiological arousal (Clark, 1986). These theories do not typically take a person’s history, personality, other symptoms, or social context into account in assessment and intervention (Gilbert, 1995). Because of their specificity, these theories have been valuable for designing successful treatment protocols for randomized control trials, but they also have weaknesses such as paying little attention to comorbidity or to personality (e.g., Kendler et al., 1993), factors which come into play in naturalistic treatment settings. One suggestion to address this problem is to work towards integrative models of clinical psychology, for example by incorporating evolution into our understanding of mental health. Gilbert (1995) suggests that evolutionary thinking could be integrated into clinical psychology by encouraging
researchers and clinicians to consider how an evolved brain would pay attention to information, process information, and make decisions, especially regarding social interactions that are crucial for survival and reproduction. The successful integration of the evolutionary construct of attachment in clinical psychology (e.g., Wallin, 2007) suggests that this is a feasible and fruitful endeavor, and we propose to extend it to other social domains.

Understanding people’s tendencies in terms of the core domains of social living could provide important information for understanding a person’s symptoms and functioning. Within the medical model of clinical psychology, it is tempting to focus on symptoms in assessment, and to then focus on treating those symptoms alone. For example, a person who experiences sadness frequently on a daily basis and who loses motivation to engage in their regular daily activities is given the diagnosis of Major Depression, and their sadness and levels of activity become targets for treatment. In the context of the medical model, less attention is paid to people’s personalities outside of Axis-II disorders, despite the fact that research demonstrates that non-Axis-II personality traits such as perfectionism are important in how people respond to therapy (e.g., Hawley, Ho, Zuroff, & Blatt, 2006).

By incorporating personality as we have discussed it into an integrative model of clinical psychology, clinicians might gain tools to differentiate presentations within disorders (e.g., depressions resulting from a loss of rank, separation from an attachment figure, or betrayal in an exchange relationship), or between disorders (e.g., perhaps depending on a person’s personality profile they
are more likely to develop specific disorders or to respond to particular types of treatments). For example, people who experience depression as a result of either loss of rank or rejection from an attachment figure might be more likely to experience clinically significant shame responses and might respond best to treatments that are designed to decrease shame and increase feelings of safeness, such as Compassion-Focused Therapy (Gilbert, 2009).

People’s expressions of disorders and responses to treatment might also differ based on their scores on dimensions within the social domains. For example, a person who becomes depressed after a betrayal might develop symptoms characterized by anger and hostility if they are high in Tracking, as opposed to a depression characterized by sadness and dejection if they are high in Overinvestment. In these cases, any standard intervention used by a clinician could be improved by focusing on cognitions or behaviours that were characteristic of specific social exchange styles, or could address motivations that typically underlie social exchange styles.

These ideas could be particularly useful if applied to Axis-II disorders such as Borderline Personality Disorder (BPD). In this disorder there are over 250 combinations for how a person’s symptoms can present themselves (Linehan, 1993). Evolutionary dimensions might help characterize particular presentations. As a speculation, perhaps extremely high scores on attachment anxiety distinguish people who exhibit symptoms related to fears of abandonment and intense or unstable relationships, whereas feelings of emptiness could be more related to elevated attachment avoidance scores. Within the social exchange domain,
perhaps the expression of anger and paranoia symptoms of BPD are related to extreme scores on the Tracking dimension, as suggested by findings from Article 2. If particular personality profiles are tied to particular presentations of a disorder, treatments can become more focused and effective.

Research is also warranted that examines our constructs in the context of group psychotherapy. Group therapy is a cost-effective way to provide therapy and so is commonly used in hospital settings. Although there is a long history of group therapy research, the majority of it relates to process groups, rather than the types of groups that in contemporary practice are frequently utilized in hospitals, which are generally focused on protocols, psychoeducation, or skills-training. Social exchange styles in particular might prove to be related to outcomes in group therapy. Article 2 provided evidence that social exchange styles influence people’s emotional reactions to social support, which is a primary resource that is exchanged between group members in psychotherapy groups. These results suggest that some people could have distressing reactions depending on the support dynamics of a particular group. One could imagine how this might interfere with therapy by drawing individuals’ attention away from the content of therapy, and towards emotional reactions that might not be discussed in a psychoeducation or skills-training group. In this vein, potentially interesting and useful lines of future research could involve testing whether specific compositions of social exchange styles within a group could be conducive to positive change, or whether promoting specific types of contexts that increase or decrease specific exchange styles could be therapeutic.
Conclusion

In this dissertation, a model of social exchange styles has been presented, in which people’s specific ways of interacting in exchange relationships are characterized by the extent to which they engage in Tracking, Fairness, Individualism, Benefit-Seeking, and Overinvestment. It is our hope that in a fully developed unified theory of personality, a person will be able to be described in terms of their behaviour in all five core social domains. This description will include an account of the evolutionary lineage of a person’s behaviour, as well as developmental and contextual influences related to why they act the way they do. A comprehensive understanding of human nature such as the one we are proposing could contribute to integrative theories in a variety of areas such as clinical psychology. Evolutionary psychology is an area that is becoming increasingly influential; we believe that it has the potential to transform our understanding of personality.
REFERENCES


APPENDIX A:
FULL REVISED SOCIAL EXCHANG STYLES SCALE

SESQ-II

This questionnaire is concerned with what we refer to as “allies.” These are people with whom you have a relationship in which you both contribute something (the “cost” of the relationship) in the expectation of gaining something (the “benefit” of the relationship). When answering this questionnaire, we do not want you to think about people with whom you have relatively intimate, emotionally involved relationships such as family members, close friends, or romantic partners. Examples of allies that you can think of include casual friends, people with whom you work on group projects at school or at work, partners in businesses, and on-going business associates such as vendors or consultants. We call these relationships “alliances.” It is important to note that alliances do not have to be manipulative and exploitive in the “Survivor” style. Furthermore, none of the personality types described is necessarily more beneficial than the others; each can be adaptive.
In order to help you focus on this kind of relationship, we would like you to list the initials of three people with whom you have an alliance or had an alliance in the past. However, these three people only serve as examples. Do not restrict your answers to your relationships with these three people. We would like to learn about your general pattern of relating to allies.

Initials of ally 1:  Initials of ally 2:  Initials of ally 3:

Instructions:
Please read each of the following statements and, according to the scale below, rate the extent to which each statement describes the way in which you relate to your allies. When responding, you can think about the way you interact with the allies whose initials you listed above. However, do not restrict your answers to your behavior with these three people.

1 2 3 4 5
Not at all like me Somewhat like me Very much like me

1. I believe that forming alliances can be beneficial for me.  
2. I am very aware that alliances have a cost.  
3. I prefer attempting to maintain alliances, rather than quickly ending them if there is a problem.  
4. While I am willing to put a lot of effort into alliances, I expect the same from my allies.  
5. Maintaining alliances is not my highest priority.  
6. The costs of alliances frequently exceed their benefits.  
7. I devote considerable effort to forming and maintaining alliances.  
8. I am willing to take advantage of my allies.
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<td></td>
<td>Not at all like me</td>
<td>Somewhat like me</td>
<td>Very much like me</td>
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<td>9</td>
<td>I pay close attention to how much I am benefiting in an alliance.</td>
<td>1</td>
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<td>10</td>
<td>I am willing to keep alliances short-term.</td>
<td>1</td>
<td>2</td>
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<td>11</td>
<td>I believe that, over the long-term, both partners should benefit equally from an alliance.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
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<td>12</td>
<td>I prefer not to have to rely on others.</td>
<td>1</td>
<td>2</td>
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<td>13</td>
<td>I occasionally find myself putting more effort into an alliance than the other person.</td>
<td>1</td>
<td>2</td>
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<td>14</td>
<td>I try to minimize my costs of remaining in an alliance.</td>
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<td>2</td>
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<td>15</td>
<td>I am comfortable with gaining more from an alliance than the other person.</td>
<td>1</td>
<td>2</td>
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<td>16</td>
<td>I focus on monitoring long-term costs in alliances.</td>
<td>1</td>
<td>2</td>
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<td>17</td>
<td>I prefer to end an alliance rather than to accept a compromise that keeps me trapped in a non-beneficial relationship.</td>
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<td>2</td>
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<td>18</td>
<td>I try to reach win-win solutions with my allies.</td>
<td>1</td>
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<td>19</td>
<td>I prefer alliances in which I am not required to commit a great deal of time or effort.</td>
<td>1</td>
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<td>20</td>
<td>I make substantial investments in alliances because I feel that I may not maintain any alliances if I do not.</td>
<td>1</td>
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<td>21</td>
<td>I accept that alliances can require substantial costs.</td>
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22. I am willing to remain in an alliance as long as I am deriving some benefits.

23. I pay close attention to how much an alliance is costing me.

24. If I form alliances, I tend to terminate them quickly.

25. I am most satisfied in alliances in which my partner and I benefit equally.

26. I can generally reach my goals more efficiently by relying on myself than by forming alliances.

27. I perceive few personal benefits in most alliances.

28. I do not engage in “hardball” negotiation tactics, preferring to maintain a friendly relationship with allies.

29. I maintain alliances with potential for long-term mutual benefits.

30. I keep track of my investments in an alliance to avoid being taken advantage of.

31. I am willing to put a lot of effort into maintaining alliances.

32. I think that, in general, if I help an ally now they will help me at some point in the future.

33. I prefer to invest as little as possible in alliances.
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<td></td>
<td>Not at all like me</td>
<td>Somewhat like me</td>
<td>Very much like me</td>
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<td>34.</td>
<td>I sometimes agree to unfair compromises in negotiations with allies.</td>
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<td>2</td>
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<td>35.</td>
<td>I realize that I cannot always receive immediate rewards from an alliance.</td>
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<td>2</td>
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<td>36.</td>
<td>I believe that alliances can yield substantial benefits.</td>
<td>1</td>
<td>2</td>
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<td>37.</td>
<td>Because I am suspicious of allies, I keep track of short-term costs and benefits.</td>
<td>1</td>
<td>2</td>
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<td>38.</td>
<td>If an alliance ceases to be beneficial for me, I am willing and able to end it.</td>
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<td>2</td>
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<td>39.</td>
<td>I try to be fair in negotiations with allies.</td>
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<td>2</td>
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<td>40.</td>
<td>I tend to invest in alliances less than the average person.</td>
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<td>2</td>
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<td>41.</td>
<td>I can be quite firm and direct in negotiations with allies.</td>
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<td>2</td>
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<td>42.</td>
<td>People are more likely to be helpful to me if I have gone out of my way to be helpful to them.</td>
<td>1</td>
<td>2</td>
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<td>43.</td>
<td>I do not believe that forming alliances can lead to large benefits for me.</td>
<td>1</td>
<td>2</td>
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<td>44.</td>
<td>I keep track of my short-term costs and benefits in an alliance.</td>
<td>1</td>
<td>2</td>
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<td>45.</td>
<td>I would seriously consider terminating an alliance in which things are not going my way.</td>
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<td>46. I am willing to compromise so that both members of an alliance can benefit.</td>
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<td>2</td>
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<td>47. I prefer not to put effort into negotiating with allies.</td>
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<td>48. I will agree to an unfair compromise in order to maintain an alliance.</td>
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<td>49. I try to obtain as much benefit as possible from alliances.</td>
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<td>2</td>
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<td>50. I focus on monitoring long-term benefits in alliances.</td>
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<td>51. I am very reluctant to terminate alliances.</td>
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<td>52. I am willing to invest in a relationship if my ally is also investing.</td>
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<td>2</td>
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<td>53. Because I do not see alliances as long-term relationships, I rarely need to monitor long-term benefits.</td>
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<td>2</td>
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<td>54. I expect to invest more than the other person in an alliance.</td>
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